

START

Final

Meeting Minutes Transmittal/Approval
Unit Manager's Meeting: 100 Aggregate Area/100 Area Operable Units
740 Stevens Center, Room 1200, Richland, Washington
September 29, 1993

FROM/APPROVAL: Eric D. Goller Date 11/17/93
Eric D. Goller, 100 Area Unit Manager, RL (A5-19)

APPROVAL: [Signature] Date 11/17/93
Jack W. Donnelly, 100 Aggregate Area Unit Manager, WA Department of Ecology

APPROVAL: Laurence E. Chaffin for Date Nov 17, 1993
Dennis Faulk, 100 Aggregate Area Unit Manager, EPA (B5-01)

Meeting Minutes are attached. Minutes are comprised of the following:

- Attachment #1 - Meeting Summary
- Attachment #2 - Attendance Sheet
- Attachment #3 - Agenda
- Attachment #4 - Action Item Status List
- Attachment #5 - Status Package 100 Area Unit Manager's Meeting August 25, 1993
- Attachment #6 - Cease Discharge to the 1325-N Liquid Disposal Facility System
- Attachment #7 - Laboratory Soil Washing Treatability Tests
- Attachment #8 - 100-HR-3 Groundwater Treatability Tests
- Attachment #9 - 100 Area Excavation Treatability Test Status
- Attachment #10 - 100-FR-1 OU LFI Vadose Investigation Validated Data Memorandum
- Attachment #11 - 100-FR-3 OU LFI Groundwater Investigation Validated Data Memorandum
- Attachment #12 - 100 NPL Agreement/Change Control Form #52
- Attachment #13 - 100 NPL Agreement/Change Control Form #58

Prepared by: Kay Kimmel Date: 11-17-93
Suzanne Clarke, Kay Kimmel, GSSC (B1-42)

Concurrence by: [Signature] Date: 11-17-93
Bob Henckel, WHC Coordinator (H6-02)



9413092.0735

**Attachment #1
Meeting and Summary of Commitments and Agreements**

**Unit Manager's Meeting: 100 Aggregate Area/100 Area Operable Units
September 29, 1993**

1. **SIGNING OF THE AUGUST 100 AREA UNIT MANAGER'S MEETING MINUTES** - Minutes were reviewed and approved with no changes.
2. **ACTION ITEM UPDATE:** (See Attachment 4 for complete status, items listed below indicate the update to Action Items made during the meeting):

1AAMS.15 No additional information.

1AAMS.16 No additional information.

3. **NEW ACTION ITEMS:**

1AAMS.18 Provide to EPA and Ecology all available shoreline site maps at a scale of 1:2000 by the October UMM. Action: Eric Goller, Bob Henckel

4. **AGREEMENTS:**

It was agreed by the three parties that the M-30-03 Milestone is complete.

5. **100 AREA ACTIVITIES:**

- **N-Reactor:** Heather Trumble is the RL Unit Manager for the N-Reactor. She requested Daryl Schilperoort to provide an update of activities at the 1325N and 1301 cribs (see attachment #6). N-Basin cleanup is scheduled to begin April 1, 1994. The value engineering study will be done in phases. Ecology requested a letter from RL discussing the details of the value engineering study. The Regulators were invited to participate and they expressed a desire to be involved in these studies.
- **182B Water Releases:** This topic was added to the agenda at the meeting. WHC indicated that 500,000 gallons of water would be required to remove then clean out the basin. The water would be disposed north of the basin. WHC indicated no impact to other sites is expected. EPA indicated they will contact RL on this discharge at a later time.
- **Milestone 30-05:** Robert E. Peterson indicated that the milestone has been fulfilled. Periodic updates will be provided when results are available.
- **Soil Washing Treatability Study:** S.V. Mattigod presented the results of the soil washing treatability study (see attachment #7). After review of recently acquired data, it was determined that the heap leaching study be given a lower priority. Therefore, results of this study will not appear in the January report.

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- 100-HR-3 Groundwater Treatability Study: Jim Duncan presented an update of the status of the groundwater treatability study, see attachment #8. He indicated that the biodenitrification laboratory testing is complete.
- 100 Area Excavation Treatability Study: Joan Woolard discussed the progress in the excavation of the Pluto Crib, 116-F-4, at 100-FR-1, see attachment #9.
- Operable Unit Status: Attachment #5 was provided for general information on the 100 Areas Operable Units.
 - **BC-1 and BC-2 Combined ROD** - Dennis Faulk requested a meeting to discuss schedules for the projected BC-1 & BC-2 consolidation.
 - **HR-2** - Comment resolution. Geophysics surveys are on hold, GPR to be completed by the end of September. Jack Donnelly requested he be kept current on the status of activities.
 - **NR-1 and NR-2 Work Plans** - These plans are being revised per previous agreement. Bryan Foley will provide Jack Donnelly with a current status of progress as soon as possible.
 - **100 Area FS** - Columbia river information will be provided in the FS with information only on technologies.

6. INFORMATION:

- 100 NPL Agreement/Change Control Form numbers 52 and 58 are provided as attachments 12 and 13, respectively. The Regulators requested that "NPL" be dropped from the title of these change forms.

7. NEXT MEETINGS: The next CERCLA Unit Managers Meetings will be held on October 27 and 28, 1993.

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**100 Aggregate Area Unit Manager's Meeting
Official Attendance Record
September 29, 1993**

Please print clearly and use black ink

PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
KAY KIMMEL	DAMES & MOORE	RL SUPPORT	376-1985
Chris Poindexter	Ecology	Ecology Support	376-3047
PAMELA INNIS	EPA	O.U. MANAGER	376-4919
Diana Sickle	WHC	Program Support	372-3141
DENNIS FAULK	SOA	UW	6-8631
Glenn Goldberg	DOE-RL	OU Manager	376-7142
BRYAN FOLEY	DOE-RL	100-A Area Manager	376-7087
BOB SCHAEK	DAMES & MOORE	GSSC	946-3688
DEBBIE HERMAN	UTILITIES	100B AREA FACILITY ECO	373-4069
THOMAS SWEET	WATER UTILITIES	183 B OPERATION	3-3126
RP HENCKEL	WHC	100 AREA	6-2091
RL BIGGERSTAFF	WHC	100 KR-4 100 Area GW	6-5634
Tom Jones	PNL	Program Office	375-2710
RC SMITH	WHC	ANAL. SERVICES	2-2537
BOB PETERSON (R.E.)	WHC-GEOSCIENCES	100 AREAS GROUNDWATER	376-5858
Harley Freeman	PNL	100 Area Soil Washing	376-8561
Kevin Rowe	WHC	Program Office	376-7711
Steven Clark	WHC	Risk Assessment	376-1513
JACK DONNELLY	Ecology	100 Area Supervisor	736-3013
Andree DeAngelis	PRC	EPA Support	(206)624-2692
Shas Matliged	PNL	100 Area Soil Wash	376-4311
Larry Gadbois	EPA	RPM	376-9884
William E. Lunn	USGS	EPA Support	206 5936210
Brian Drast	"	"	"
David Holland	Ecology	UW, Support	736-3027

9570-7508116
9413092-0738

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**Attachment #3
Agenda**

**Unit Manager's Meeting: 100 Aggregate Area/100 Area Operable Units
September 29, 1993**

100 Area General Discussions

- **N-Reactor - Heather Trumble**
- **M-30-05 - Robert E. Peterson**
- **100 Area Excavation Treatability Studies**
 - **Identify key players, roles and responsibilities; and protocol for interfacing with field activities.**
 - **100-HR-1 Excavation Treatability Study - Jil Frain**
 - **Soil Washing Treatability Study - Jim Field**
 - **100-HR-3 Treatability Study - Jim Duncan**

Operable Unit Status - Questions - Naiknimbalkar/Ayres/Krug/Steve Vukelich/Jim Roberts/Kytola

Action Item Status

943092.0740

Attachment #4

**Unit Manager's Meeting: 100 Aggregate Area/100 Area Operable Units
September 29, 1993**

Action Item Status List

ITEM NO.	ACTION	STATUS
1AAMS.9	DOE shall send a letter to Ecology, suggested from S. H. Wisness to D. Jansen with a cc. to EPA, explaining what is included in the ER Program for the N Reactor Area and how the multiple programs will be handled organizationally. Action to J. D. Goodenough (2/27/92). Action: E. D. Goller (5/27/92). Action: Bryan Foley (7/28/93).	Closed 08/25/93.
1AAMS.15	Provide response to April 2 EPA letter concerning river seeps. Action: Eric Goller (RL) 7/29/92.	Open (7/29/92). In DOE for transmittal (8/26/92). Letter is pending (09/29/93).
1AAMS.16	DOE should transmit Revision 1 of M-30-01.	Open (7/29/92). In DOE for transmittal (8/26/92). Letter is pending (09/29/93).
1AAMS.18	Provide to EPA and Ecology all available shoreline site maps at a scale of 1:2000 by the October UMM. Action: Eric Goller, Bob Henckel	Open 09/29/93.

9413092-0741

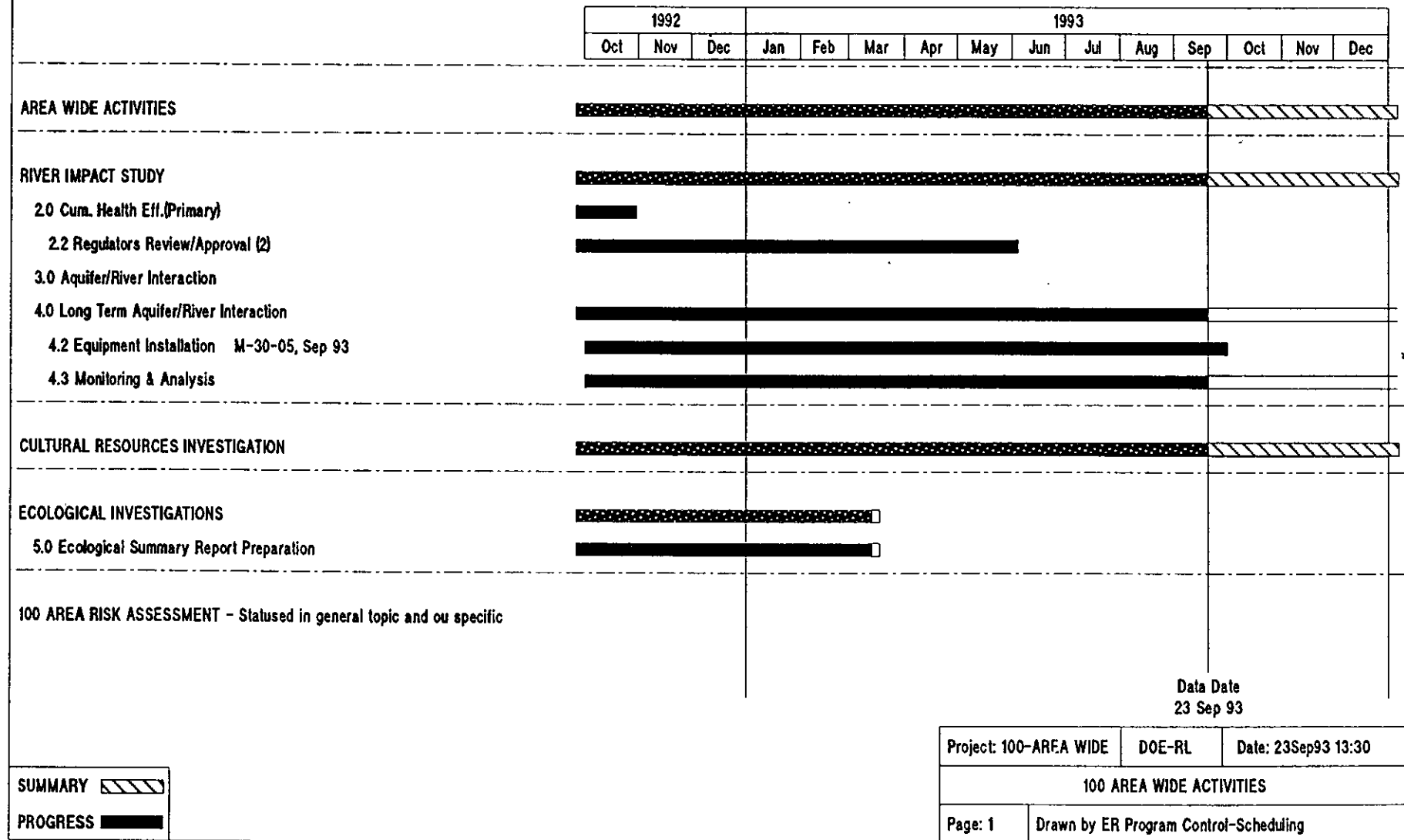
100 AREA UNIT MANAGERS MEETING

SEPTEMBER 29, 1993

STATUS PACKAGE

240-260616
940920742

100-AREA WIDE ACTIVITIES



Status of 100-Area Wide Activities
September 1993

River Impact Studies

Public review on the Columbia River Impact Evaluation Plan ended September 4, 1993. A significant number of comments were received; a discussion among the Tri-Parties is being scheduled for late September to decide on an approach to complete the document (Primary Document)

River sediment sampling field work, and sampling and validation have been completed. The evaluation report is to be distributed this month.

100-Area Ecological Investigations

The report delineating habitats of concern, as identified in the Hanford Site Baseline Risk Assessment Methodology Report and the Columbia River Impact Evaluation Plan, is being prepared for distribution in late September or early October.

The 100 Areas CERCLA Ecological Investigations report, with analysis of sample results, is in final editing before distribution in late September or early October.

47-2006-15
94092-74

100 AREA TREATABILITY TEST STATUS
September 1993, Unit Managers Meeting

SOIL WASHING TREATABILITY TEST

100 Area soil washing tests for 100-B/C and 100-D samples are about one month behind schedule due to breakdown/repair time for gamma counters and competition with 300 Area soil washing screening. However, this is not expected to impact the January 31, 1993 milestone to complete a draft report. Attrition scrubbing and preliminary dry autogenous grinding tests have been completed. A chemical solution has been tested showing up to 70% removal of the ¹³⁷Cs in the 2mm to 0.25 mm fraction of soils. Microscopic analyses indicate that an iron/aluminum oxide is largely removed during attrition scrubbing and sand particles are rounded. All 100-B/C and 100-D tests are expected to be completed by the end of October. Characterization and testing of 100-F soils is scheduled to start in October and continue through mid February.

100-HR-3 GROUNDWATER TREATABILITY TEST

Chromium and Uranium Reduction/Precipitation and Ion Exchange:

OVERALL: The final report is being written and will be submitted shortly for WHC review.

-Reduction/Precipitation Reactions:

All phases of the chemical reduction/precipitation laboratory studies have been completed. The ferric chloride reduction/precipitation samples have been sent to PUREX for analysis. The requested analyses on filtrate and precipitate are: gross alpha, gross beta, uranium, chromium and nitrate.

-Ion Exchange:

The column breakthrough tests have been completed on DOWEX 21K. The cycling tests have begun --these tests are to determine the amount of column volumes required for elution after breakthrough and resin degradation with time.

Biodenitrification:

The laboratory phase of this effort has been completed. The results from analysis have been reported and the first draft of the final report has been submitted to WHC. WHC comments have been incorporated and the report is being prepared for the next round of comments by RL.

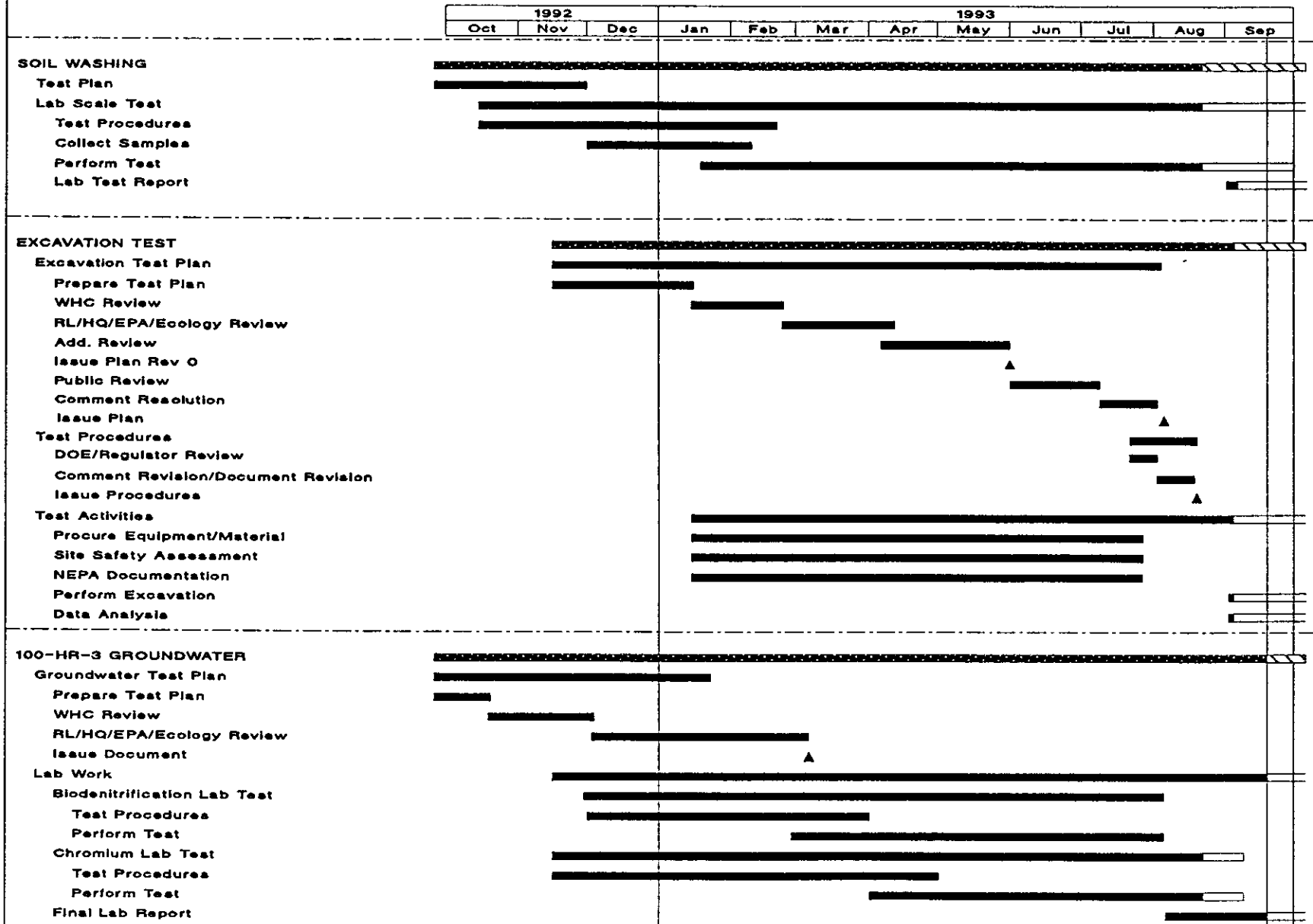
100-HR-1 EXCAVATION TREATABILITY TEST

The Test Plan and Procedures have been revised to incorporate all comments and have been issued. The pre-job safety briefing for this work was held on September 8, 1993. Site prep. work and procedure mock up activities were conducted at the 116-F-4 Crib the week of September 13, 1993 in order to



prepare for actual excavation activities. Excavation of the 116-F-4 Crib is expected to be initiated September 20, 1993.

540-2606-10
9/30/93 0745

100-AREA TREATABILITY TESTS



Date Date
23 Sep 93

Summary 
Progress 

Project: 100-Area RI/FS Activities		Date: 23Sep93 12:32
100-AREA DRAFT TREATABILITY TESTS		
Page: 1	Drawn by ER Program Control-Scheduling	

100-BC-1 SOURCE OPERABLE UNIT WORK SUMMARY
September 20, 1993

Task 11 - Qualitative Risk Assessment:

The final document was delivered to EPA and Ecology on July 31, 1993.

Task 13 - Limited Field Investigation (LFI) Report:

The final document was delivered to EPA and Ecology on July 31, 1993.
Comments were received from EPA and are currently being dispositioned.

100-BC-2 SOURCE OPERABLE UNIT WORK SUMMARY
September 20, 1993

RI/FS Work Plan:

Regulator comments have been incorporated.

Field Activities:

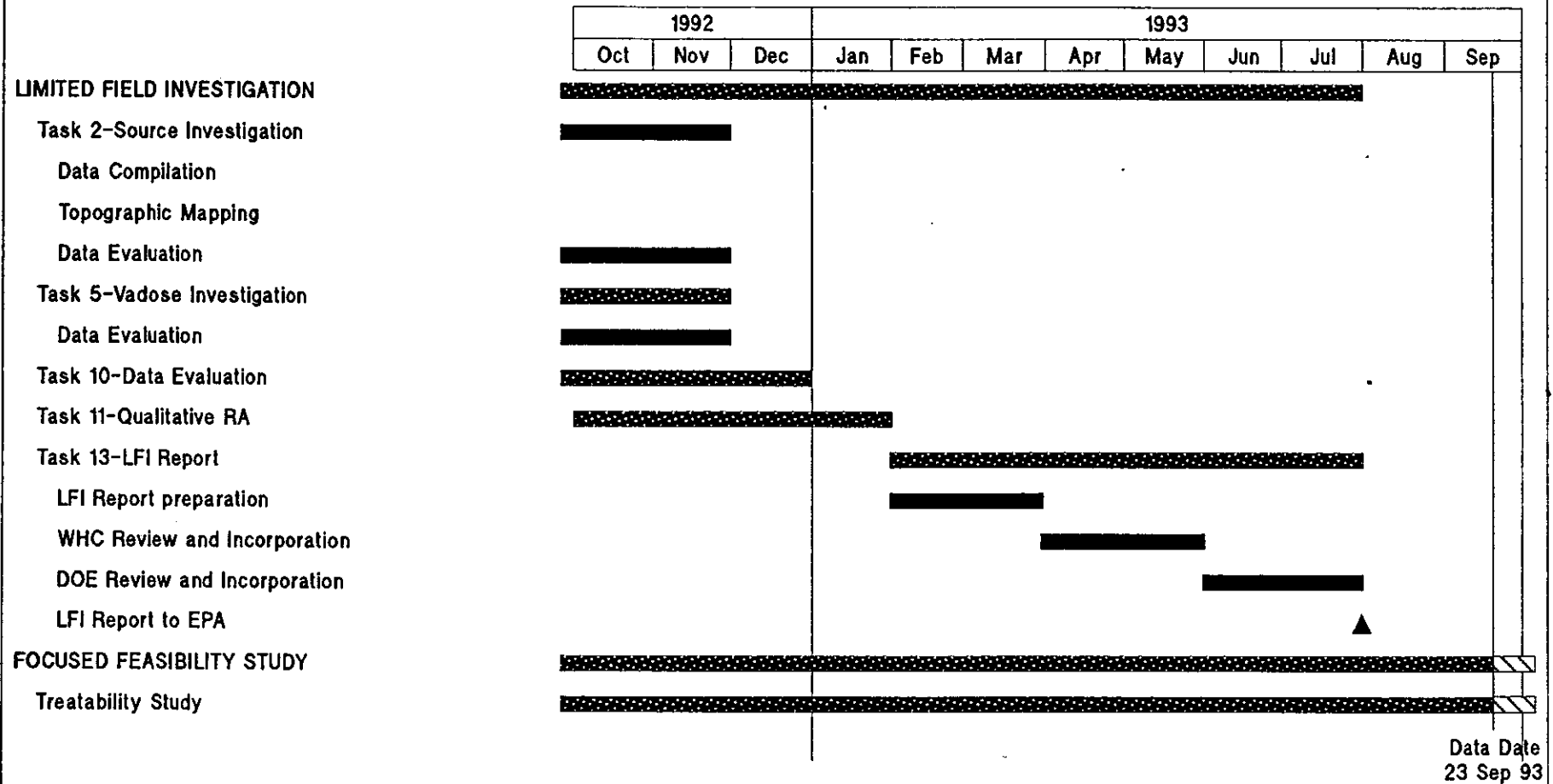
Vadose drilling at the 116-C-2A pluto crib is complete.

100-BC-5 STATUS

- 1ST QUARTER (JULY), 2ND QUARTER (OCTOBER), 3RD QUARTER (JANUARY), 4TH QUARTER (APRIL) GROUNDWATER SAMPLING COMPLETE. SAMPLING WILL BE ON A SEMI-ANNUAL BASIS STARTING IN OCTOBER 1993.
- SAMPLE VALIDATION REPORTS FOR DRILLING SAMPLE DATA AND 1ST QUARTER GW SUBMITTED DECEMBER 31, 1992
- SAMPLE VALIDATION REPORT FOR 2ND QUARTER GW SUBMITTED APRIL 14, 1993
- SAMPLE VALIDATION REPORT FOR 3RD QUARTER GW SUBMITTED JUNE 1, 1993
- SAMPLE VALIDATION REPORT FOR 4TH QUARTER GW SUBMITTED AUGUST 27, 1993
- LFI AND QRA REPORT SUBMITTED AUGUST 30, 1993

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100-BC-1 OPERABLE UNIT

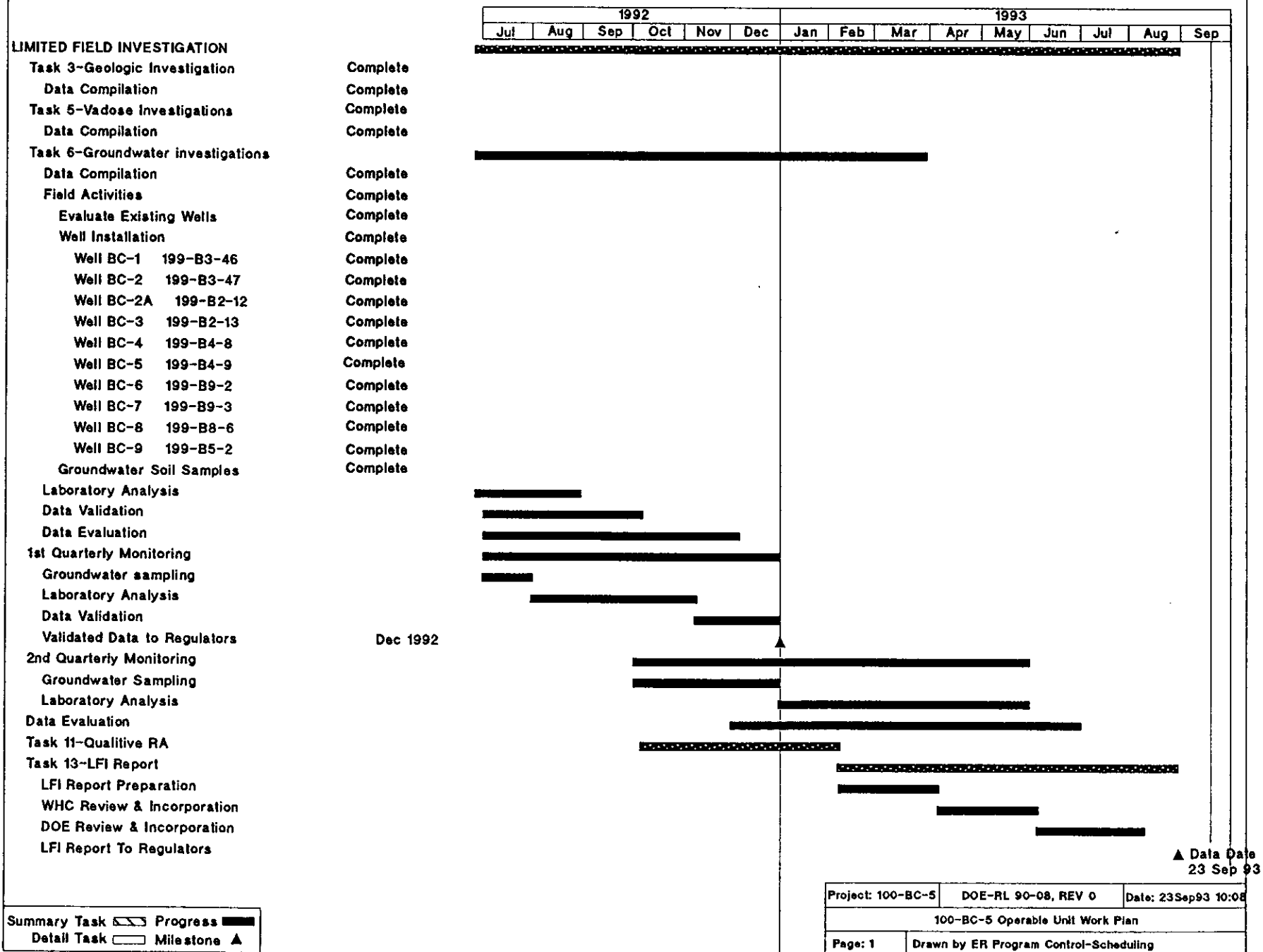


Summary

Progress

Project: 100-BC-1	DOE-RL 90-07, Rev 0	Date: 23Sep93 15:32
100-BC-1 Operable Unit Work Plan		
Page: 1	Drawn by ER Program Control-Scheduling	

100-BC-5 OPERABLE UNIT



FY 1993 ACTIVITIES FOR 100-KR-1

SEPTEMBER 1993 STATUS REPORT
N.M. Naiknimbalkar

o	Four Vadose Boreholes	October/November 1992
	116-K-1 Effluent Crib	Completed
	116-K-2 Effluent Trench	Completed
	116-KE-4A Retention Basin	Completed
	116-KW-3A Retention Basin	Completed
o	Four Test Pits	
	116-KE-4B	Completed
	116-KE-4C	Completed
	116-KW-3B	Completed
	116-KW-3C	Completed
o	Sample Analysis	March 93
o	Data Validation	April 93

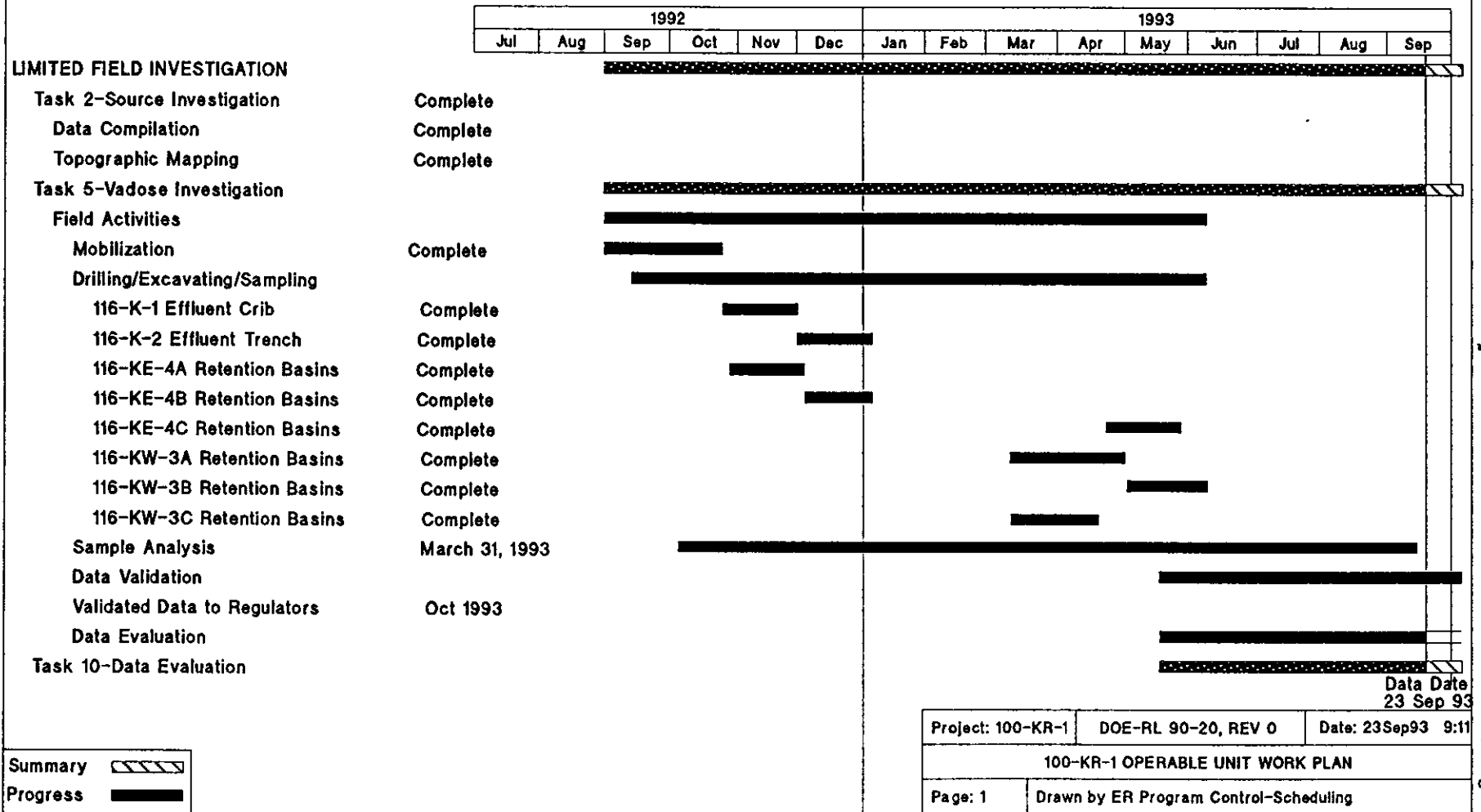
All vadose borehole and test pit sample validation data has been submitted to DOE-RL for distribution to Regulators.

100-KR-4 STATUS

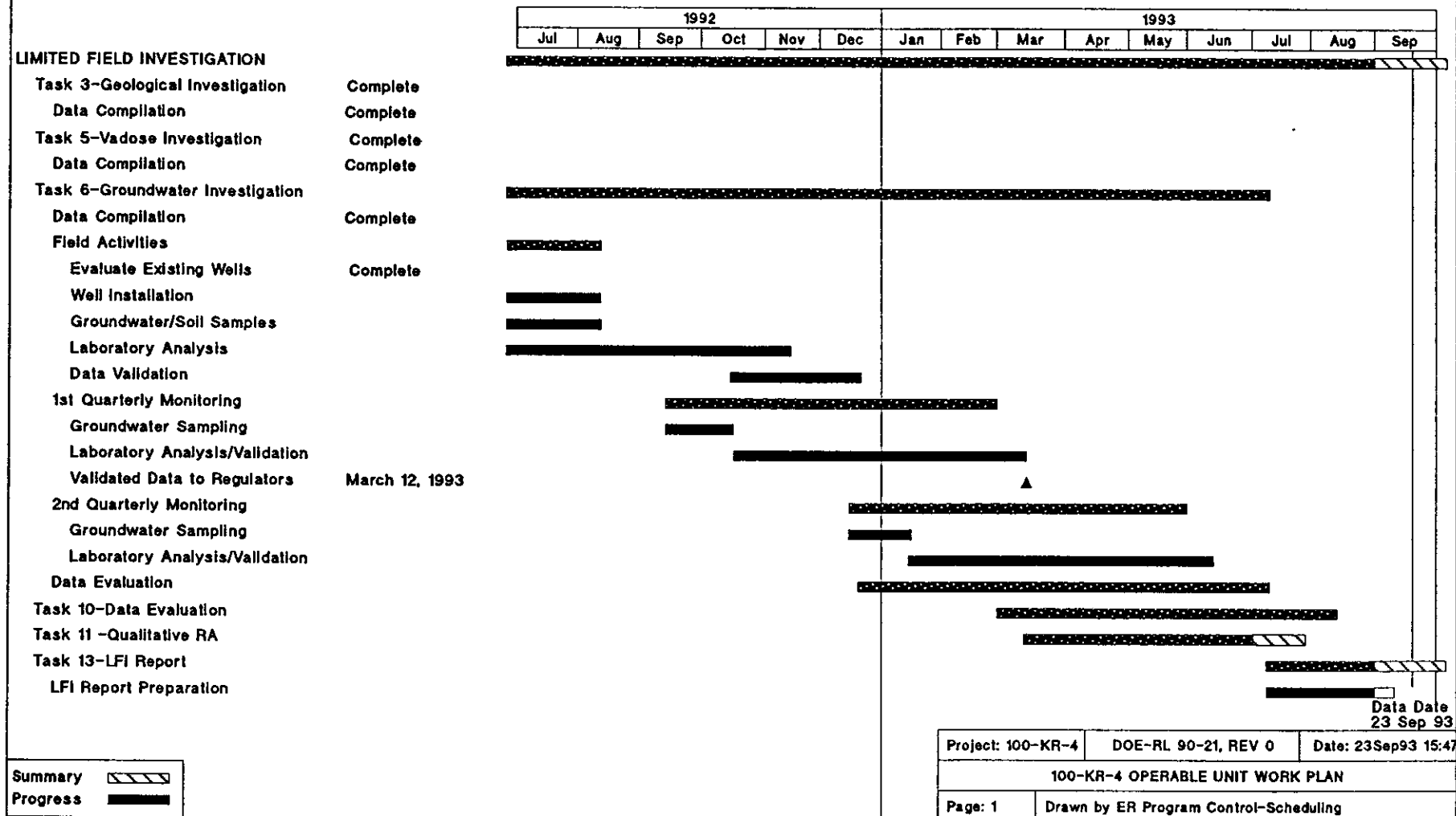
- GROUNDWATER SAMPLING WILL BE ON A BI-ANNUAL BASIS STARTING IN DECEMBER, 1993 WITH A REDUCED ANALYTE LIST.
- QUALITATIVE RISK ASSESSMENT AND LIMITED FIELD INVESTIGATION REPORT IN PROGRESS AND APPROXIMATELY 60 % COMPLETE.

06-002-0750

100-KR-1 OPERABLE UNIT



100-KR-4 OPERABLE UNIT



100-NR-1

100-NR-1 Surface Radiation Survey

Fortyfour of the 46 hot spot sites detected during the surface radiation survey have been remediated. The two remaining areas appear to be dumps containing radioactive material, insulation, wires and other debris. Remediation of these two sites will require more extensive planning and may require heavy equipment. These sites, as an interim measure, will be stabilized and posted as Underground Radioactive Materials Areas by the end of September.

100 NR-2 GROUNDWATER OPERABLE UNIT
WORK SUMMARY 9/29/93

WORK PLAN

Progress has resumed on completing the 100 NR-2 Work Plan.

TASK 6 - GROUNDWATER INVESTIGATION

Quarterly Monitoring - Four rounds of groundwater samples have been taken.

Data Validation - The soil data has been validated.

9/29/93 10:00 AM

100-NR-1 OPERABLE UNIT

LIMITED FIELD INVESTIGATION

Task 2- Source Investigation

Data Compilation

Surface Radiation

Soil Gas Survey

Data Evaluation

Task 5-Vadose Investigation

Field Activities

Drilling/Sampling

120-N-2

119-N

1322-N

Settling Pond

166-N

116-N-2

Test Pit 120-N-1

Borehole Abandonment

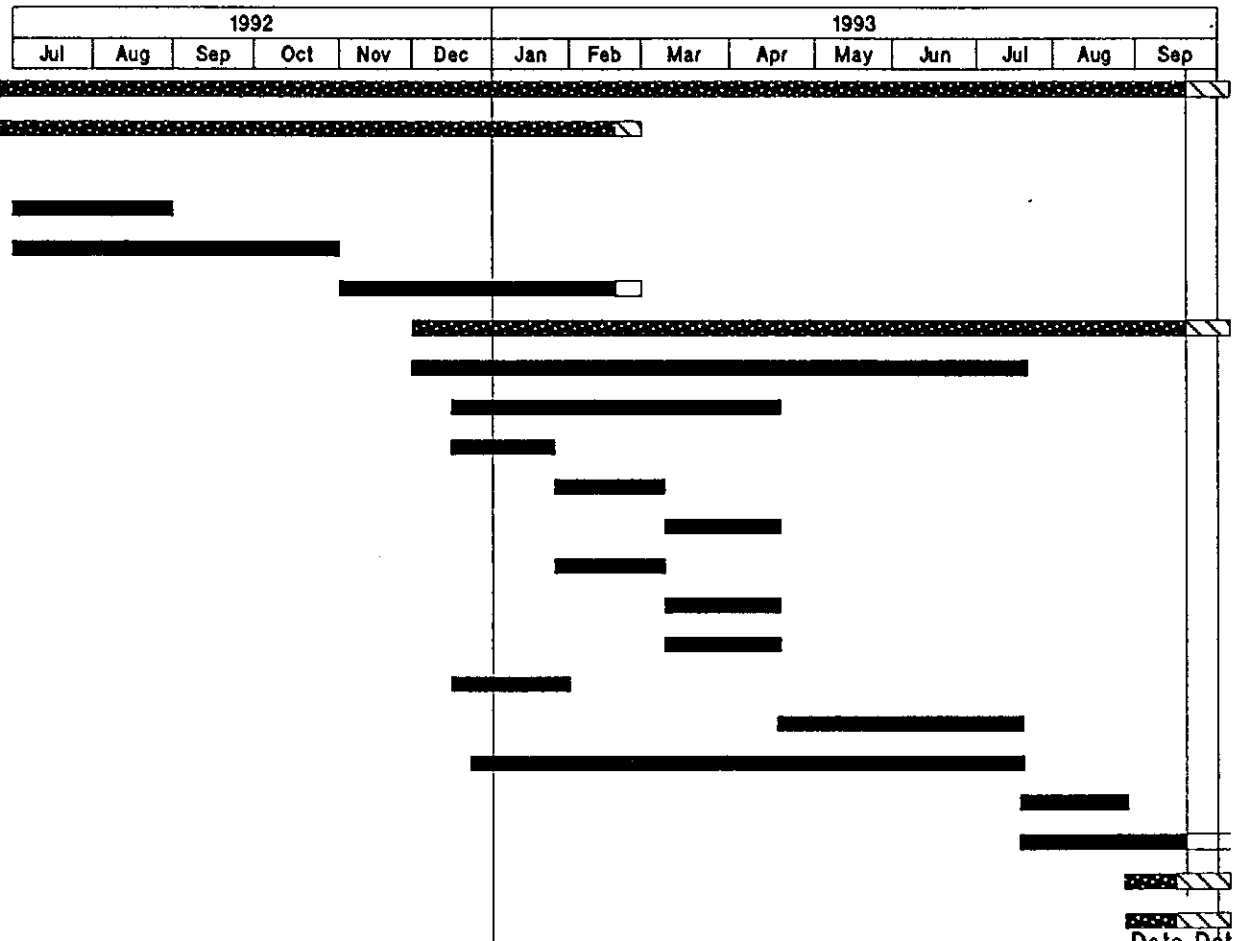
Sample Analysis



Data Validation

Data Evaluation

Task 10-Data Evaluation

Task 11-Qualitative RA



Summary 
 Progress 

Project: 100-NR-1	DOE-RL	Date: 23Sep93 9:58
100-NR-1 OPERABLE UNIT WORK PLAN		
Page: 1	Drawn by ER Program Control-Scheduling	

100-NR-2 OPERABLE UNIT

LIMITED FIELD INVESTIGATION

Task 3-Geological Investigation

Data Compilation

Task 5-Vadose Investigation

Data Compilation

Task 6-Groundwater Investigation

Data Compilation

Field Activities

Well Siting

Well Installation

Well N-1

Water Level Measurement

Air Monitoring

Groundwater/Soil Samples

Laboratory Analysis

Data Validation

Data Evaluation

Task 11-Qualitative RA


Task 13-LFI Report


FOCUSED FEASIBILITY STUDY

IRM PROPOSED PLAN

1992						1993								
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep

Data Date
23 Sep 93

Summary 

Progress 

Project: 100-NR-2	DOE-RL	Date: 23Sep93 8:12
100-NR-2 OPERABLE UNIT WORK PLAN		
Page: 1	Drawn by ER Program Control-Scheduling	

FY 1993 Activities for 100-DR-1/DR-2
N.M. Naiknimbalkar

SEPTEMBER 1993 Status Report

100-DR-1 QUALITATIVE RISK ASSESSMENT STATUS

Qualitative Risk Assessment
Document Preparation:

- o Qualitative Risk Assessment Report is being reviewed by Regulators.

LFI Report

- o Limited Field Investigation (LFI) report is being reviewed by Regulators.

100-DR-2 Work Plan

- o 100 DR-2 Work Plan was reviewed by DOE/DOE-HQ. The comment resolutions meeting was conducted to resolve comments. The document is being revised to incorporate comment resolutions.

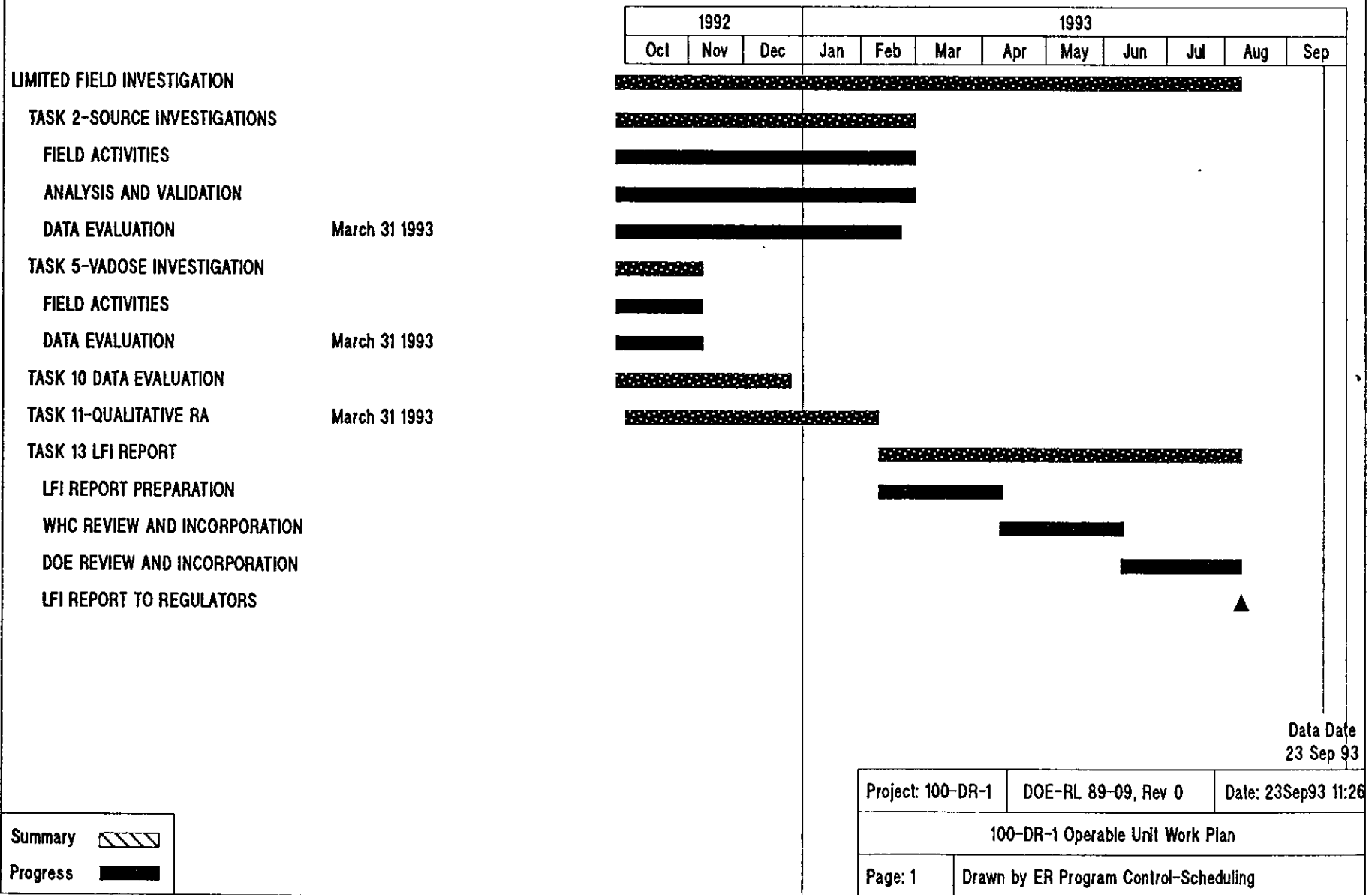
100-DR-2 Field Activities:

- o The following field activities have been completed at this operable unit.
- o Description of Work (DOW) for DR-2 is based on agreements between Regulators, DOE-RL and WHC and has been released as WHC-SD-EN-AP-139, Rev. 0. Engineering Change Notice (ECN) has been completed to clarify the contents of DOW for ease of use in the field activities and will be a supplement to the DOW.

One borehole will be drilled through 116-DR-7 Inkwell Crib and one test pit each, will be excavated at 116-DR-3 Trench and Sodium Dichromate Transfer Station. CLP analysis will be conducted for borehole samples. SW-846 analysis will be done for test pit samples. Physical samples will be collected from the borehole site.

943992.0756

100-DR-1 OPERABLE UNIT



100-HR-1

100-HR-1 Limited Field Investigation/Qualitative Risk Assessment

The 100-HR-1 LFI and QRA have been submitted to Ecology and EPA for review.

100-HR-2 SOURCE OPERABLE UNIT
WORK SUMMARY
September 1993

PLANNING DOCUMENT

Comments on the work plan were received from the regulators in early September. Draft responses are 75% complete and a comment resolution meeting will most likely take place during the week of 9/27.

SURFACE GEOPHYSICS

GPR and EMI surveys are being conducted at the 118-H-1, -2, -3, and thimble burial sites. All data is expected to be collected by September 30 with interpretations to follow.

100 HR-3 GROUNDWATER OPERABLE UNIT
WORK SUMMARY 9/29/93

TASK 6 - GROUNDWATER INVESTIGATION

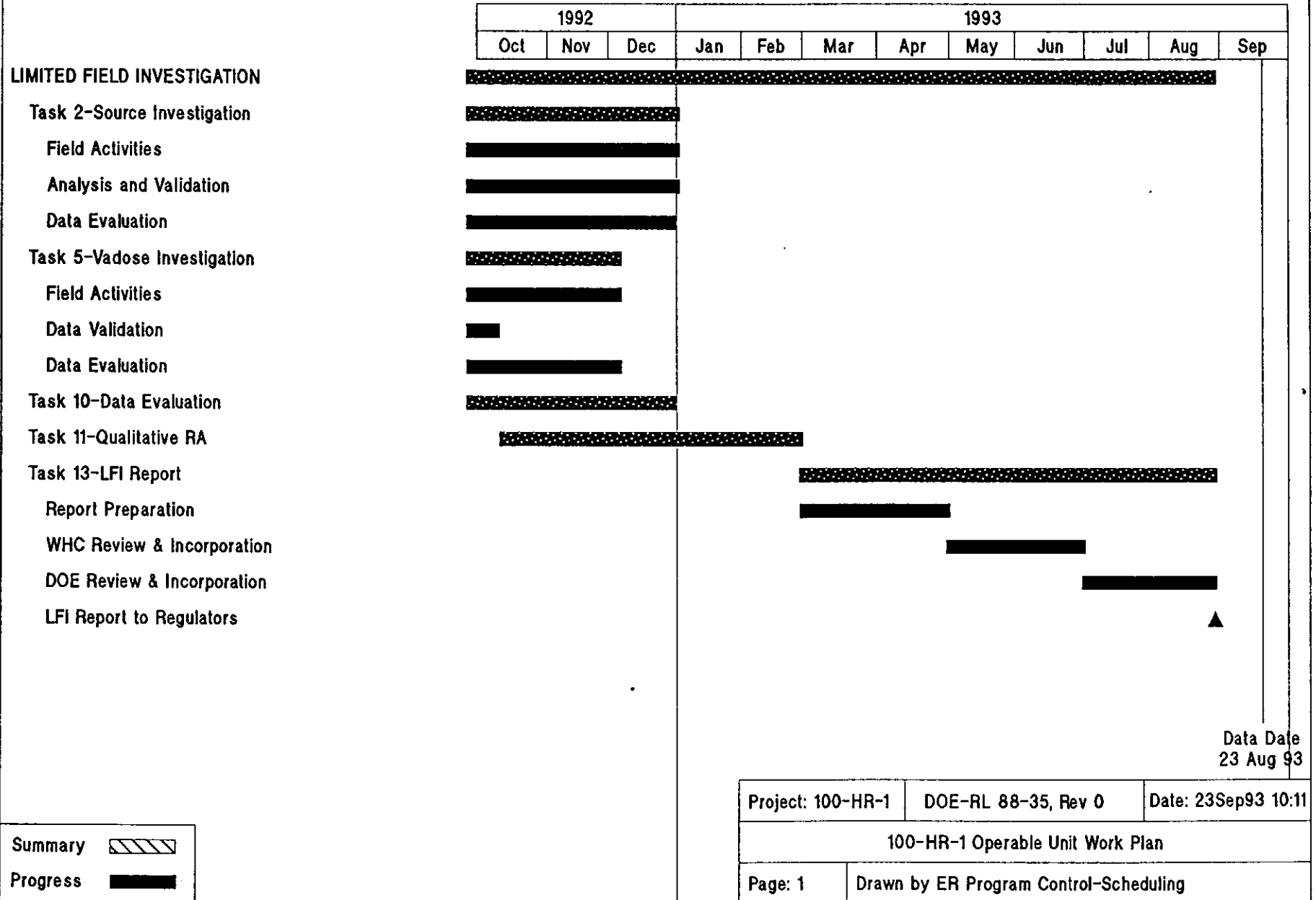
Quarterly Monitoring - Five rounds of groundwater samples have been taken.

Data Validation - First, second, third and fourth round groundwater data has been validated.

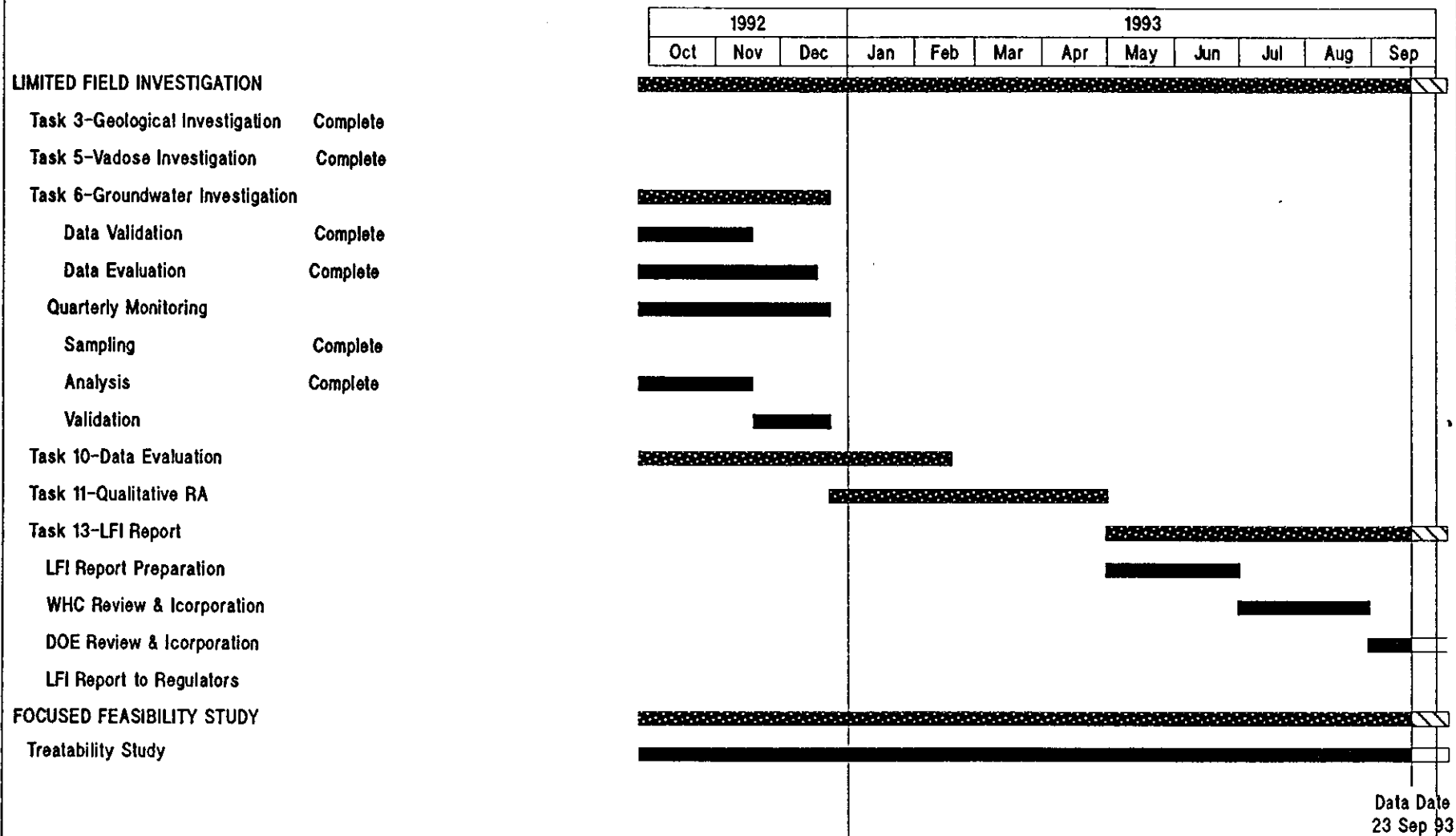
LFI Report - The Decisional Draft of the LFI Report is at DOE for review. It will be submitted to the regulatory agencies in October.

QRA Report - The QRA Report is at DOE for review. It will be submitted to the regulatory agencies in October.

100-HR-1 OPERABLE UNIT



100-HR-3 OPERABLE UNIT



Summary

Progress

Project: 100-HR-3 DOE-RL 88-36, Rev 0 Date: 23Sep93 9:00

100-HR-3 Operable Unit Work Plan

Page: 1 Drawn by ER Program Control-Scheduling

OU MANAGERS MEETING - SEPTEMBER 93

100-FR-1

- Validated data was received from HASM on September 21, 1993 and was submitted to DOE/RL on September 17, 1993.

100 FR-3 GROUNDWATER OPERABLE UNIT WORK SUMMARY 9/29/93

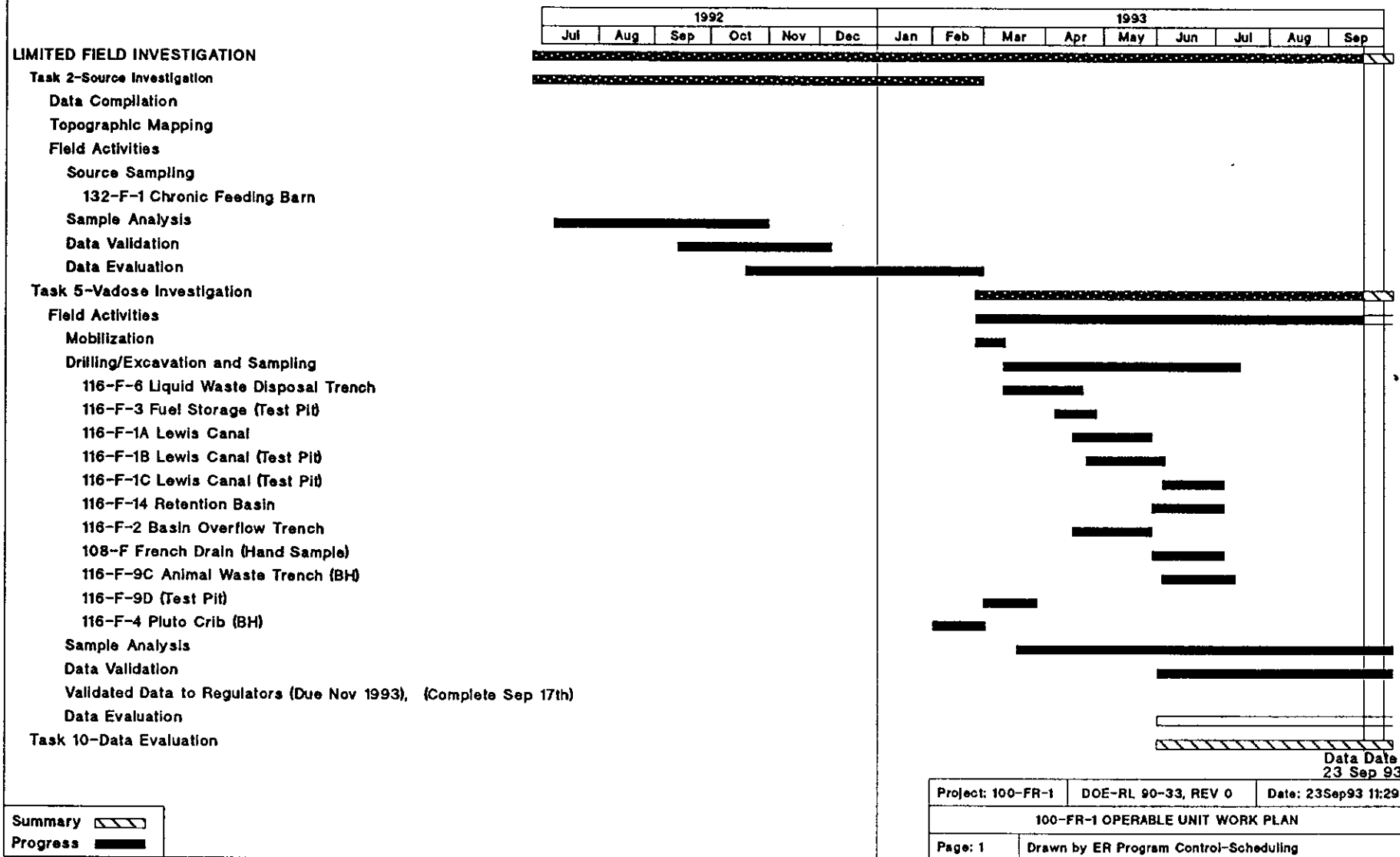
TASK 6 - GROUNDWATER INVESTIGATION

Quarterly Monitoring - Three rounds of groundwater samples have been taken. The fourth round is scheduled in October.

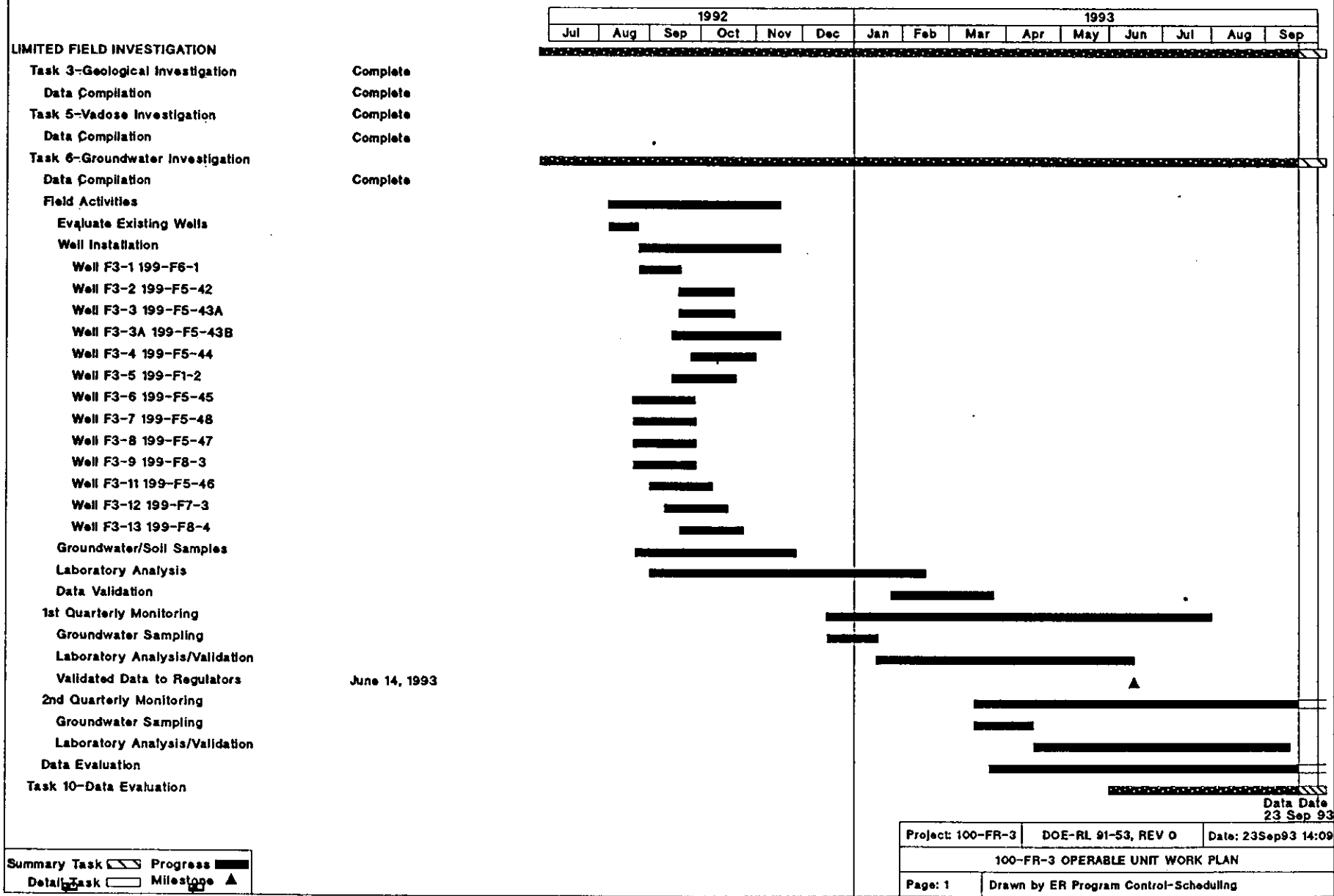
Data Validation - Two rounds of groundwater data have been validated.

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100-FR-1 OPERABLE UNIT



100-FR-3 OPERABLE UNIT



DARYL SCHILPEROORT

September 29, 1993

1325N LIQUID DISPOSAL FACILITY

TPA Milestone M-17-15

- **Cease Discharge by June 1995**

Liquid Effluent Consent Order DE-91NM-177

- **Limit Discharge to Less Than 2 gpm**

No Discharges Since April 1991

- **Administratively Controlled**
- **Possibility Still Existed For Discharges**

Physical Measures Completed September 9, 1993

- **Closed Valves (9)**
- **Removed Hand Wheels**
- **Removed Power to Pumps (16)**
- **Provided Additional Assurance**
- **Eliminated Inadvertent Discharges**

Hazards and Mitigating Actions

- **Fire System Actuation**
1,300 gpm
 - **5-10 Minute Fire Department Response**
 - **60 Minute Use of Fire Water**
91,000 gal
- **Potable Water**
 - **Storage Capacity**
200,000 gal
- **Flooding of Four Areas Adjacent to Lift Station**
 - **Storage Capacity**
345,929 gal

9413092-0768

CELL
SUMP PUMP
NO. 6

LOCK
OFF
ON

LAYID
TA



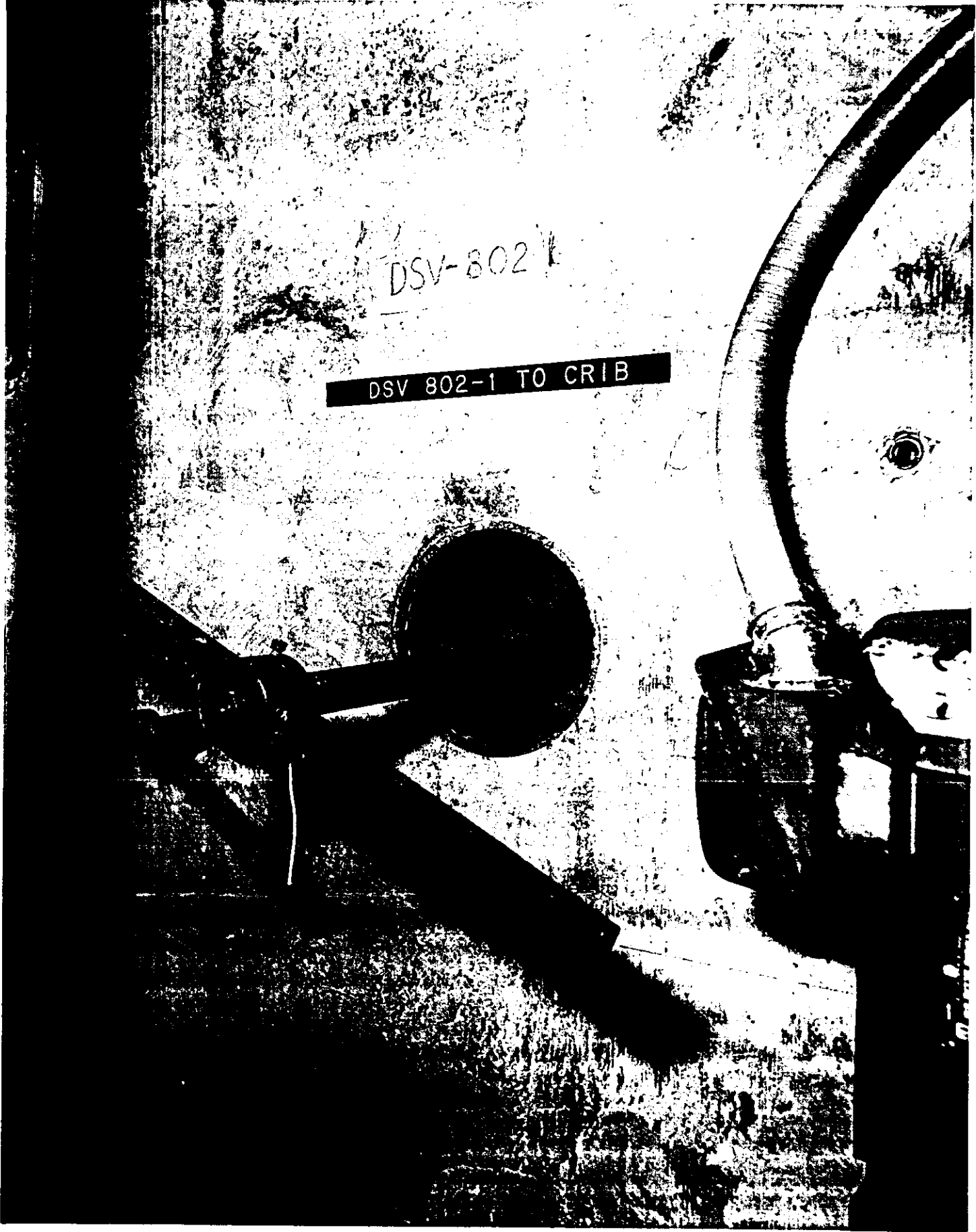
IN-01543-22

Cell #6 Sump Pump
Breaker
"OFF"
MCC-37 109A

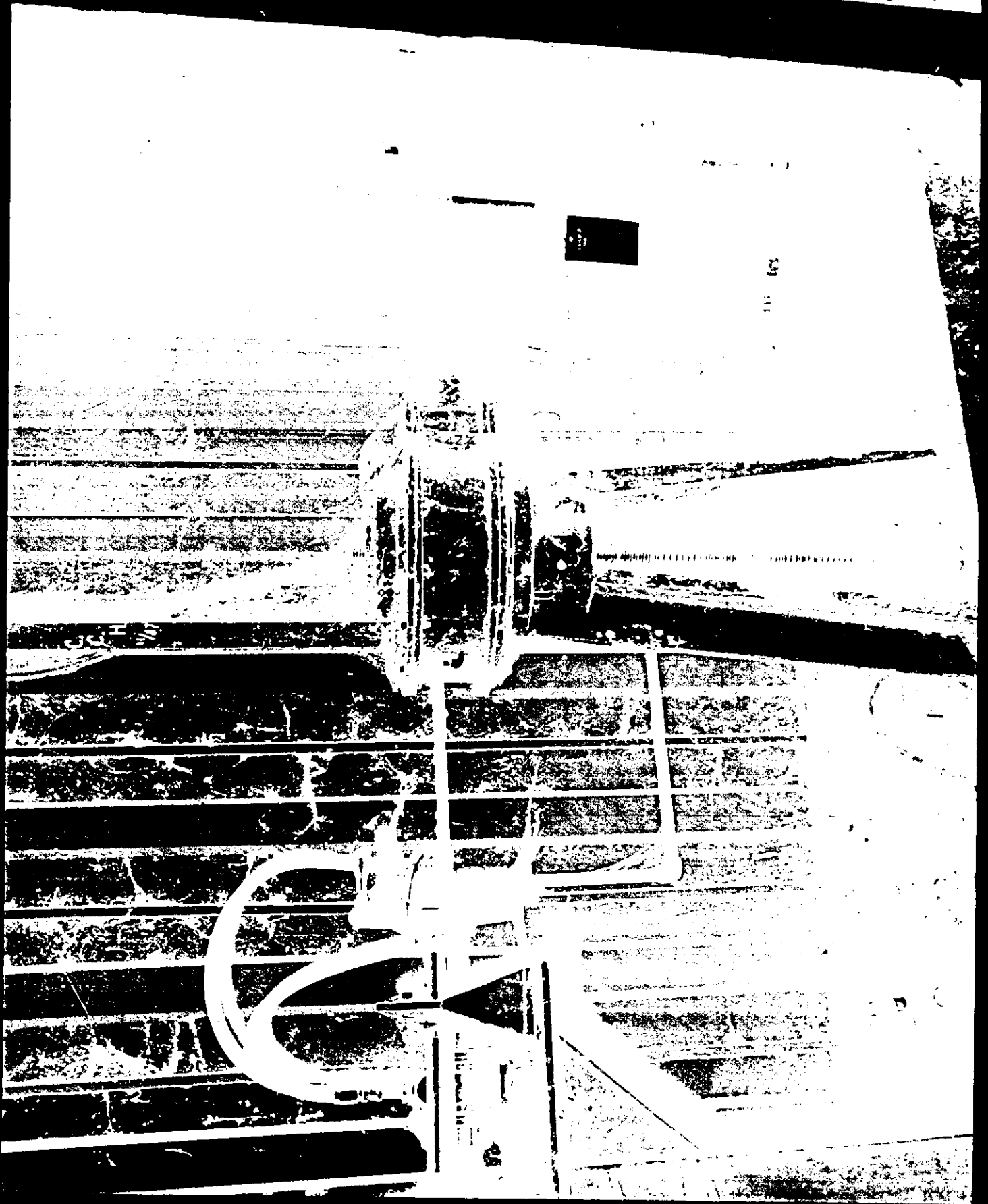
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BY: 64000 214 005 001

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9413092.0770



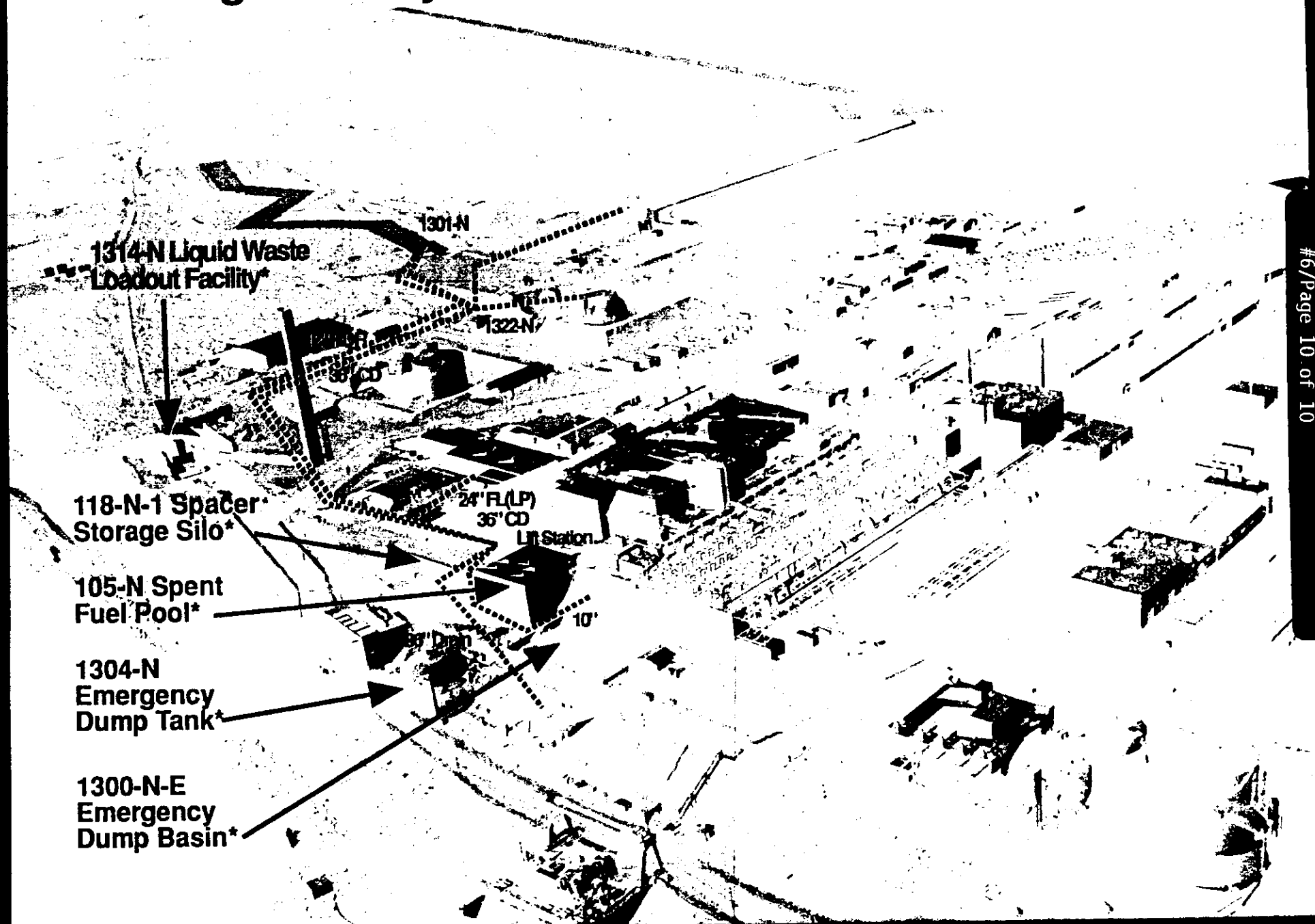


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9413092.0722

100-N High Priority Waste Sites*



**LABORATORY SOIL WASHING TREATABILITY TESTS
100 AREA**

SEPTEMBER UNIT MANAGERS MEETING

**WESTINGHOUSE HANFORD COMPANY
ENVIRONMENTAL RESTORATION ENGINEERING**

SCHEDULE

**OCT 30 - Complete "100-B/C and D" Tests
(1 Month behind schedule)**

DEC 15 - Draft Report from PNL to WHC

JAN 31 - Draft Report to Regulators (TPA MILESTONE)

FEB 15 - Complete "100-F" Tests (Plutonium/Strontium)

MAR 30 - Draft Report from PNL to WHC, "F" Tests

100 Area Soil Washing Test Status

Completed:

- Chemical and Isotopic Analyses
- Moisture Content
- Specific Gravity
- Soil pH, Ion Exchange, TOC
- Sequential Extraction
- Wet Screening
- Attrition Scrubbing ("D" samples, 0.25mm - 2mm)
- Optical and Electron Microscopy
- Chemical Extraction (0.25 - 2 mm)
- Mineralogy by X-Ray Diffraction

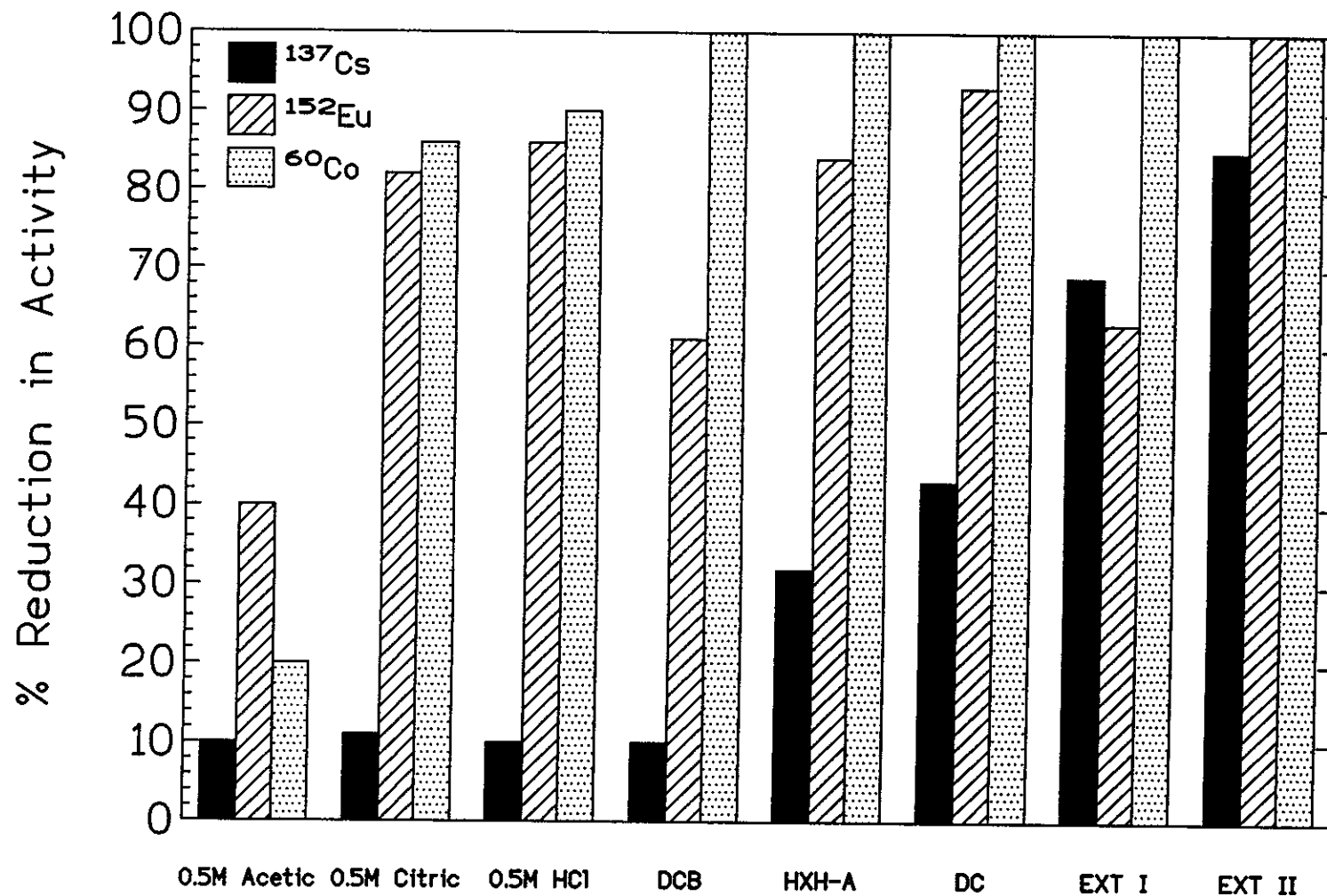
In Progress:

- Wet and Dry Autogenous Grinding
("B/C" samples, + 2mm particles)
- Surface Area
- Combination/Optimization

Scheduled:

- Heap Leaching
- Waste Water Treatment
- Characterization and Testing of "F-Area " samples

Chemical Extraction: 116-D-1B Soil (2 - 0.25 mm Fraction)



COMBINATION/OPTIMIZATION TESTS

TEST	ATTRITION/ GRINDING	AMMONIUM ACETATE AND CITRIC ACID	CHEMICAL EXT2
1	X		
2	X	X	
3	X		X
4	X	X	X

COMMENTS

Outlook much brighter than last month

Dependent on "Clean Up" level, Attrition scrubbing may be sufficient for 0.25 mm split at 116-D-1B

2 mm split may be more reasonable for 116-C-1 inlet end

+ 80% Cs-137 activity reduction using Chemical EXT2
(Name to be released after invention disclosure)

Results to date to be presented at ER '93 in Oct.

100-HR-3 GROUNDWATER TREATABILITY TESTS

UNIT MANAGERS MEETING

SEPTEMBER 1993

BIODENITRIFICATION

- **ALL LABORATORY TESTING COMPLETED**
- **DRAFT FINAL REPORT --**
 - **WHC COMMENTS INCORPORATED**
 - **BEING PREPARED FOR DOE-RL REVIEW**

9413092.0782

ID	Name	Scheduled Start	Scheduled Finish	1993													Jan	Feb
				Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov		
1	100-HR-3 BIODENITRIFICATION	11/26/92	1/7/94															
2	QUALITY ASSURANCE	11/29/92	1/7/94															
3	PREPARE TEST DOCUMENTS	11/26/92	2/10/93															
9	TEST SET UP	2/2/93	3/30/93															
16	TESTING	3/25/93	8/2/93															
17	Task 3.4.1 Inhibition Tests	3/25/93	4/19/93															
24	Task 3.4.3 pH Tests	4/14/93	5/14/93															
31	Task 3.4.2 Carbon Ratios	5/4/93	6/4/93															
38	Task 3.4.4 Temperature	5/11/93	6/4/93															
45	Task 3.4.5 Carbon Source	5/16/93	7/2/93															
52	Task 3.4.6 Large Volume Denitrification	5/26/93	7/8/93															
60	Task 3.4.7 Final Confirmation Tests	7/6/93	7/30/93															
68	Data Analysis and Draft Final Report Preparation	4/27/93	7/30/93															
69	Submit Draft Report to WHC	8/2/93	8/2/93															
70	FINAL REPORT REVIEWS	8/2/93	1/7/94															
76	ISSUE FINAL REPORT	1/7/94	1/7/94															

Project: 100 Area Biondenitrification
Date: 4/30/93

Critical ☐
Noncritical ☐

Progress ☐
Milestone ☐

Summary ☐
Rolled Up ☐

ATTACHMENT 2

CHROMIUM/URANIUM PRECIPITATION & ION EXCHANGE

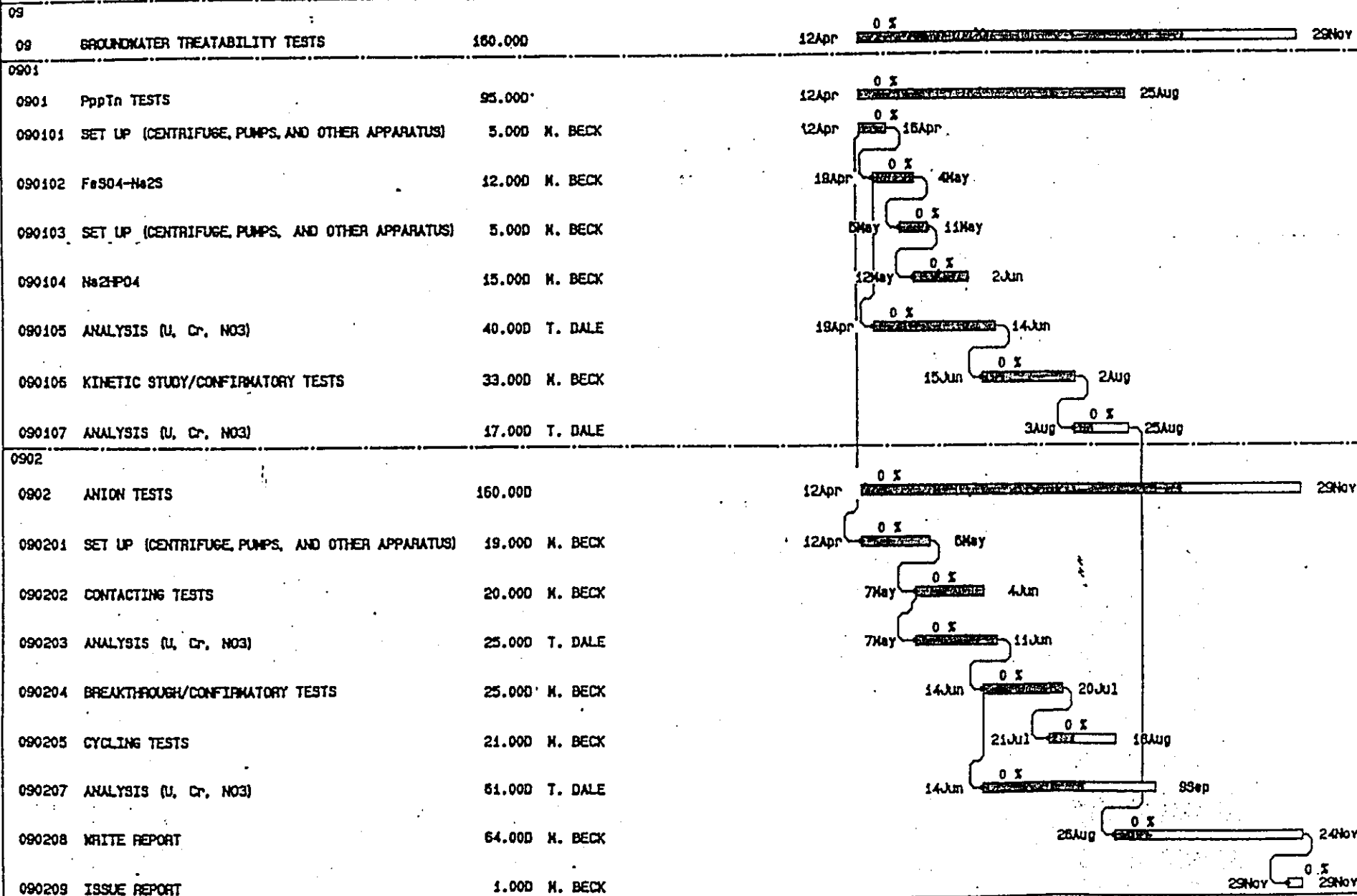
- **REDUCTION/PRECIPITATION STUDIES COMPLETE**
- **ION EXCHANGE --**
 - **BREAKTHROUGH TESTING**
 - **CYCLING TESTS**
- **LABORATORY ANALYSIS**
- **DRAFT FINAL REPORT -- IN PREPARATION**

Ex situ Removal of
Chromate, Nitrate, & Uranium (VI)

Actual setup began January 30, 1993

CODE1

1993									
3Feb	4Mar	1Apr	6May	4Jun	2Jul	3Aug	8Sep	6Oct	3Nov



Legend

Early CPM

Project: GMIT	GMIT	Date: 9Apr93 11:52
GROUNDWATER TREATABILITY TESTS		
Page: 1	Drawn by GMITNET Graphics	

ATTACH MGMT 1

100 AREA EXCAVATION TREATABILITY TEST STATUS
September 29, 1993

EXCAVATION PROGRESS: (As of 9/28/93)

- Began excavation 9/20/93.
- As of 9/29/93 = 1,000 yard³ of clean material has been excavated and < 100 yard³ of contaminated material has been placed in Terra Stor.
- The first is being dug to "even" out the level of excavation. East side of dig is 6' deep while the west side is 2' deep.
- Miscellaneous metal debris and piping found north of crib (not contaminated).
- Contamination has been located in excess of 1000 cpm at the crib and outside the crib area
 1. Metal riser leading to the crib.
 2. Soil west of the riser pipe (up to 8500 cpm)
 3. Plastic west of riser pipe (up to 3000 cpm)
 4. Metal debris south of the crib (up to 1000 cpm)

- An unknown 4" pipe was found at about 30'" to the north of the crib (not contaminated and intact).
- An additional 4" pipe (and contaminated soil) was located south of the crib. The pipe may lead to the ball washer crib
- Extensive radiation surveying is making the excavation proceed very slowly.
- Terra Stor is filling up more rapidly than anticipated due to contamination outside of the crib.

Dust Control:

- Real time monitoring has shown no dust is escaping.
- Wind has been minimal.
- Lignosite (pine tar derivative) and Soil Seal (polymeric binder) are being used on different portions of the clean spoil piles. Difficult to estimate the area and application rates.
- XDCA is being used in the crib overnight and on the contaminated spoils in the Terra Stor (sugar beet bi-product).

Analytical:

- The first lift sample has been sent to the laboratory (verification of clean spoil piles).
- ECN to the procedures is being prepared to reduce the number of VOA/SemiVOA samples as agreed to by EPA and Ecology.

Field Screening:

- The first lift is currently being screened for radioactivity

DON'T SAY IT --- Write It!

Attachment #10

Page 1 of 1

DATE: September 28, 1993

TO: Pam Innis, EPA
Jack Donnelly, Ecology

B5-01
Kennewick

FROM: Eric Goller, RL

EDG

A5-19

Telephone: 376-7326

cc: Jim Patterson, WHC H6-27 (w/o atts.)
Bob Henckel, WHC H6-02 (w/o atts.)
Alan Krug, WHC H6-02 (w/o atts.)
Bob Scheck, D&M G1-01 (w/o atts.)
Kay Kimmel, D&M G1-01 (w/o atts.)

SUBJECT: 100-FR-1 OU LFI VADOSE INVESTIGATION VALIDATED DATA

Attached please find a document reporting validated data summaries from the 100-FR-1 OU LFI vadose investigations. The document title and WHC identification number is:

WHC-SD-EN-TI-191 Data Validation Report for the 100-FR-1 Operable Unit
Vadose Soil, Rev 0.

3/1/94

Please feel free to contact me with any comments or questions regarding this document. In addition, comments or questions regarding the technical elements of this document can be directed to Bob Henckel (376-2091) or Dick Biggerstaff (376-5634).

06/07/93 07:00

DON'T SAY IT --- Write It!

DATE: September 28, 1993

TO: Pam Innis, EPA
Dib Goswami, EcologyB5-01
KennewickFROM: Eric Goller, RL *EDG* A5-19

Telephone: 376-7326

cc: Jim Patterson, WHC H6-27 (w/o atts.)
Bob Henckel, WHC H6-02 (w/o atts.)
D Biggerstaff, WHC H6-02 (w/o atts.)
Bob Scheck, D&M G1-01 (w/o atts.)
Kay Kimmel, D&M G1-01 (w/o atts.)

SUBJECT: 100-FR-3 OU LFI GROUNDWATER INVESTIGATION VALIDATED DATA

Attached please find a document reporting validated data summaries from the 100-FR-3 OU LFI groundwater investigations. The document title and WHC identification number is:

WHC-SD-EN-TI-187 Data Validation Report for the 100-FR-3 Operable Unit
Second Round Groundwater, Rev 0.

30683

Please feel free to contact me with any comments or questions regarding this document. In addition, comments or questions regarding the technical elements of this document can be directed to Bob Henckel (376-2091) or Dick Biggerstaff (376-5634).

160760146

Control Number: 52	100 NPL Agreement/Change Control Form _ Change _X_ Agreement _ Information Operable Unit(s): 100 Area	Date Submitted: 5/26/93 Date Approved:
Document Number and Title: Milestone M-30-05: Install all field instrumentation and initiate monitoring activities necessary to perform long-term evaluation of Columbia River and unconfined aquifer interaction, in accordance with the tasks defined in operable unit work plans listed in M-30-03 (September 1993)		Date Document Last Issued: New
Originator: R. P. Henckel		Phone: 376-2091
<p>Summary Description: TPA Milestone M-30-05 is the final milestone in a series that is oriented around the relationship between 100 Areas groundwater and the Columbia River. M-30-05 covers the installation of field equipment and initiation of monitoring activities to evaluate the interaction between the unconfined aquifer and the Columbia River. Two purposes behind this evaluation are (1) an improved description of the flow system within each of the 100 Areas, and (2) a better understanding of the processes involved in the mixing of groundwater and river water.</p> <p>The purpose of this 100 NPL Agreement Form is to document agreement on those activities that are to be completed by September 30, 1993 to fulfill the obligations of milestone M-30-05. This milestone will be considered to have been met when data logging equipment has been installed in the 100 Areas to supplement existing installations (Task 3), and monitoring activities, as described in an attached activity plan (Task 6), are underway. For your information the attached activity plan describes the locations of wells to be equipped with automated data recorders; data analysis methods; and an implementation schedule. Task 3 and Task 6, to be completed by September 1993, fully meets the intent of milestone M30-05. The remaining Tasks address monitoring and data evaluation activities that continue beyond September 1993. Responses to EPA and Ecology comments on an initial draft of the activity plan are attached as an Appendix to the plan.</p>		
Justification and Impact of Change:		
WHC Operable Unit Coordinator <i>R. P. Henckel</i> R. P. Henckel		Date 8-25-93
DOE Unit Manager E. Goller <i>E. Goller</i>		Date 8/25/93
Ecology Unit Manager <i>[Signature]</i>		Date 9/24/93
Env. Protection Agency Unit Manager <i>Laurence E. Sadlois</i>		Date 8-25-93

9413092.0792

EQUIPMENT INSTALLATIONS AND MONITORING ACTIVITIES
TO SATISFY TPA MILESTONE M-30-05

1.0 INTRODUCTION

The need for information on the transport of contaminated groundwater from the 100 Areas of the Hanford Site into the Columbia River is recognized in Tri-Party Agreement Milestone M-30-00 "Integrated General Investigations and Studies for the 100 Areas." The central theme of this milestone is the relationship between contaminated groundwater underlying the 100 Areas operable units and the Columbia River. The objective of these investigations is to obtain information on the nature, extent, and transport of contaminants from the 100 Areas to the Columbia River via the groundwater pathway. This information may be used to support decisions regarding remediation of contaminated groundwater. (Marginal redlines in the following text indicate changes made to the May 26, 1993 draft that was reviewed by EPA and Ecology).

1.1 SCOPE OF M-30-00 INVESTIGATIONS

Milestone M-30-00 has five sub-milestones:

- M-30-01: Evaluate the impact to the Columbia River from contaminated riverbank seepage (February 1992)
- M-30-02: Develop a plan to determine cumulative health and environmental impacts to the Columbia River (May 1992)
- M-30-03: Complete non-intrusive field work [described in 100 NPL Agreement #13, June 1992 Unit Manager Meeting] (September 1992)
- M-30-04: Evaluate the interaction between the river and unconfined aquifer to estimate aquifer hydraulic parameters. (September 1992)
- M-30-05: Install equipment and initiate monitoring activities to perform long-term evaluation of river/aquifer interaction (September 1993)

Work on the final sub-milestone M-30-05 has been underway at 100-B, 100-H, and 100-F Areas since late 1991 as part of 100 Aggregate Area investigations. Additional automated water level recorders and monitoring activities are planned to expand coverage to all of the retired reactor areas.

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1.2 OBJECTIVES FOR MILESTONE M-30-05

Data gathering activities conducted under M-30-05 support the long-term evaluation of interaction between the 100 Areas unconfined aquifer and the Columbia River. Three objectives have been defined to aid in formulating a scope of work for this evaluation:

- Determine the direction and rate-of-flow for groundwater within each of the 100 Areas groundwater operable units.
- Describe the water table variability where the unconfined aquifer is influenced by fluctuations in river level.
- Characterize the inland extent of river water influence on groundwater quality along the shoreline.

Data gathering activities in support of these objectives include automated water level recorders in wells and at river stations; depth-to-water measurements in wells using steel tapes; conductivity probes for water chemistry information; and use of borehole velocity meters. Water level and water quality data from other programs may be used to augment the M-30-05 data set.

This equipment is currently being used to monitor changes in 100 Areas unconfined aquifer water levels. Additional measurements will be obtained at intervals selected to characterize daily, weekly, and seasonal changes in the water table. This information, along with historical data, forms the basis for describing the general direction and rate-of-flow of groundwater.

Greater emphasis will be placed in areas where groundwater contaminant plumes are known to exist, such as chromium in the 100-HR-3 operable unit and strontium-90 in the 100-NR-2 operable unit. Water level data and borehole velocity measurements will improve conceptual models for specific contamination problems. Finally, site-specific monitoring activities will improve current insight into how bank storage of river water influences contaminant concentrations observed in shoreline monitoring wells.

The tasks described below are intended to support these objectives by analyzing water level data that already exist; obtaining additional data where gaps are present; and establishing a monitoring program that is focused on the flow regime at each reactor area. The field equipment installations and initiation of monitoring activities that are to be completed by September 1993 are described in Tasks 3 and 6. The remaining tasks describe work that will continue beyond the September 1993 milestone date, as part of the river/groundwater interaction evaluation process.

2.0 TASKS ASSOCIATED WITH MILESTONE M-30-05

To satisfy the intent of Milestone M-30-05 for long-term evaluation of Columbia River/unconfined aquifer interaction, the following program is planned. The program includes elements to be completed by September 1993 (equipment installation and initiation of monitoring activities -- Tasks 3 and 6), as well as activities that will continue beyond September 1993.

2.1 TASK 1: ANALYZE EXISTING INFORMATION ON GROUNDWATER DIRECTION AND RATE OF FLOW AT EACH REACTOR AREA

Considerable information is currently available to describe the general direction and rate-of-flow of groundwater through the 100 Areas. The Operational Monitoring program produces semi-annual water table maps for the northern part of the Hanford Site to depict conditions in June (high water) and December (low water) each year (e.g., Kasza and others, 1992). The Hanford Site Environmental Surveillance Program also produces regional water table maps on a periodic basis (Woodruff and Hanf, 1992). RCRA-regulated treatment, storage, or disposal facilities are located at 100-N, 100-D, and 100-H Areas, and these programs produce regular assessments of groundwater flow (e.g., Hartman 1993a and 1993b; Peterson 1993).

Each of these TSD facilities requires a groundwater monitoring program designed to (1) detect contamination in groundwater, or (2) if contamination is known, to determine the concentration, extent, and movement of contamination. The Operational Monitoring program is conducting a similar groundwater monitoring program at 100-K to support detection of potential leakage from the K-East Fuel Storage Basin. To better describe the movement of contamination, automated water level recorders are currently operating at 100-B, 100-H, and 100-F Areas; they have collected hourly data since late 1991. Additional recorders have recently been put in operation at 100-K and 100-D Areas.

As part of this task, supporting documents will be prepared that describe groundwater flow at each reactor area. Short-term variability as a result of river fluctuations will be described using hourly water level data obtained by the automated systems. Historical data from steel tape measurements will be used to supplement the hourly data and to provide coverage in areas beyond the influence of short-term river fluctuations. Monthly manual measurements have been obtained recently in all Areas as part of CERCLA activities, as well as by other programs.

The supporting documents will contain (1) a listing of the data available for each automated station in wells or the river, (2) tables showing summary descriptive statistics, (3) cross sections that depict daily and seasonal variability, and (4) a description of how river stage fluctuations are attenuated as they propagate inland from the shoreline.

2.2 TASK 2: DEPLOY TEMPORARY TRANSDUCERS IN WELLS THAT ARE PRESUMED TO BE INFLUENCED BY SHORT-TERM RIVER FLUCTUATIONS

To help identify wells that are appropriate for automated water level recorders, temporary pressure transducers will be deployed. This equipment will record hourly water levels for approximately five days, to determine the degree to which the well is influenced by daily river fluctuations. The measurements are calibrated using steel tape measurements, and the resulting elevation data are accurate to approximately 0.1 ft for wells that have accurately surveyed top-of-casing reference points.

Temporary pressure transducers records generally are not required for those reactor areas that already have water level recorders in operation (i.e., 100-B, 100-H, and 100-F). Exceptions include new wells that are candidates for permanent equipment or relocation of existing equipment. Temporary equipment data have been obtained from 100-K (February 1993), 100-D (April 1993), and 100-F (May 1993) to help decide on permanent recorder locations in those Areas. Use of the temporary equipment arrays is coordinated with well development and testing needs.

2.3 TASK 3: INSTALL AUTOMATED WATER LEVEL RECORDING EQUIPMENT IN WELLS INFLUENCED BY SHORT-TERM RIVER FLUCTUATIONS (by September 1993)

After appropriate well locations have been identified, automated water level recorders will be installed. These data logger systems are described in Campbell and others (1993). Briefly, a pressure transducer (or other sensor such as temperature or conductivity) is lowered into a monitoring well. Data are recorded at selected intervals for a period of time. The data are periodically transmitted via radio to a central computer for initial processing and subsequent interpretive uses. The data are managed and stored by the Westinghouse Geosciences organization and Pacific Northwest Laboratory.

Selection criteria for installing permanent water level recording equipment are described in Section 3 of this Plan, along with information on well locations, number of installations, and the sequence of installations. Analysis methods are discussed in Section 4. In addition to the 16 water level recorders operating in the 100-Areas during April 1993, approximately 20 new installations are planned. The equipment for these installations is being transferred from the 300-FF-5 operable unit program, which completed its data gathering objective in March 1993.

2.4 TASK 4: OBTAIN STEEL OR ELECTRICAL TAPE WATER LEVEL MEASUREMENTS TO COMPLEMENT AUTOMATED WATER LEVEL RECORDER NETWORKS

Monthly taped water level measurements will continue to be collected in the vicinity of each of the 100 Areas in wells not equipped with automated water level recorders. These measurements include wells inland of the zone that is strongly influenced by daily and weekly river fluctuations, which is on the order of 500 to 1000 feet.

Several programs currently support steel or electrical tape water level measurements in 100 Areas wells. These programs include RCRA TSD facility groundwater monitoring; operational monitoring of selected facilities under DOE Order 5400; CERCLA characterization activities; and the Sitewide Environmental Surveillance program.

2.5 TASK 5: BOREHOLE VELOCITY MEASUREMENTS

Borehole velocity meters are being evaluated for use in describing the groundwater motion. The meter currently available (Model 40L, KV Associates, Falmouth, Massachusetts) requires a cased borehole with screened open interval, which limits its use to relatively new monitoring wells. Preliminary results from the 100-H and 100-K Areas have been encouraging. A second meter design that is permanently installed in the aquifer using a temporary borehole will also be tested for potential future use.

In addition to providing direct measurement of flow direction and speed through the borehole, measurements in multiple wells or boreholes can be combined with water table gradient data and used to infer aquifer hydraulic properties. Data from borehole velocity meters can be used to corroborate flow information derived from water table maps.

2.6 TASK 6: INITIATE FIELD ACTIVITIES TO DESCRIBE THE BANK STORAGE OF RIVER WATER AND ITS INTERACTION WITH GROUNDWATER (by September 1993)

Field data collected in support of bank storage investigations includes physical and chemical characteristics of river and groundwater that may be used as tracers of each water type. Temperature has been used in the past as an indicator of bank storage of river water in the 300 Area (e.g., Raymond and Brown, 1963). Electrical conductivity, which is related to the dissolved salt content of water, is an easily measured parameter that is characteristic of the two water types (river = low conductivity; natural groundwater = high). Liquid waste disposal may cause either increased or decreased conductivity in groundwater, depending on the nature of the waste.

Electrical conductivity is being measured hourly in well 199-H4-11, which is located near the shoreline, as well as at the 100-H Area river station. A third installation has recently been completed at seep #153-1, located near well 199-H4-11. Data will be available soon to describe changes in electrical conductivity that correlate with fluctuations in the Columbia River level. Information generated by the 100-H conductivity data will be used to plan additional measurements in other Areas.

Borehole conductivity measurements will also be used to measure the change in conductivity with depth in the submerged screened interval of a well. Profiles of conductivity as a function of depth have provided insight on tritium concentrations in wells monitoring the K-East fuel storage basin. One of the monitoring activities to be initiated by September 1993 is to measure conductivity profiles in wells located within the zone of daily/weekly influence of bank storage, as estimated from historical and new conductivity and water level data. These results are being used to demonstrate the extent to which river water either mixes with groundwater in wells near the river, or alternatively, is layered with groundwater.

2.7 TASK 7: MAINTAIN FIELD SYSTEMS CAPABILITY, MANAGE FIELD DATA, INTERPRET DATA, AND REPORT RESULTS

The automated water level recorder and data transmitting system represents an extremely useful tool for a variety of environmental restoration activities. In addition to the applications described above to help satisfy the information needs of TPA Milestone M-30-00, the system may be used for (1) groundwater monitoring at liquid waste facilities, (2) designing activities

for remediation of contaminated groundwater, and (3) monitoring remedial actions as they take place. The system can be adapted for a variety of field measurements, such as hydrostatic pressure, temperature, and electrical conductivity. The capability to continuously monitor groundwater flow direction and speed is currently under study.

A level-of-effort will be sustained to maintain the field equipment and data processing capability for potential future applications, in addition to the M-30-05 objectives. Reporting will include an annual progress report that contains a summary of the data collected during the previous year, a description of current projects that are using the system, and any changes to the system's capabilities. The first of these reports has been published (Campbell and others, 1993). Reports also may be generated to support other users of water level and shoreline water quality data.

2.8 IMPLEMENTATION SCHEDULE

Tasks 3 and 6 are the principal activities associated with meeting the September 1993 obligations of Milestone M-30-05:

- Task 3: Install Automated Water Level Recording Equipment in Wells Influenced by Short-Term River Fluctuations (Completed during May and June, 1993)
- Task 6: Initiate Field Activities to Describe Bank Storage of River Water and Its Interaction with Groundwater (Conductivity measurements in a shoreline well, nearby bank seepage area, and the river underway in July; conductivity profiles obtained from 100-H wells in August; modification and testing of borehole velocity meter complete)

Activities associated with the intent of Milestone M-30-05 that continue beyond September 1993 include:

- Task 1: Analyze Existing Information on Groundwater Direction and Rate of Flow at Each Reactor Area (FY94)
- Task 2: Deploy Temporary Transducers in Wells that are Presumed to be Influenced by Short-Term River Fluctuations (as needed to plan new, or to modify, recorder networks)
- Task 4: Obtain Steel or Electrical Tape Measurements to Complement Automated Water Level Recorder Networks (integrated schedule with other measurement programs, such as RCRA and Sitewide Surveillance)
- Task 5: Borehole Velocity Measurements (testing of borehole velocity meter completed; field application to help map aquifer hydraulic properties in 100-H Area planned for August/September 1993)
- Task 7: Maintain Field Systems Capability, Manage Field Data, Interpret Data, and Report Results (annual report on systems in April 1994; other supporting documents as results from Tasks 1, 5, and 6 become available during FY94)

3.0 WATER LEVEL RECORDER INSTALLATIONS

The following describes automated data recorder installations that are designed to obtain data for evaluating the interaction between the Columbia River and the Hanford Site unconfined aquifer in the 100 Areas.

3.1 WELL SELECTION CRITERIA

The wells identified in this Plan have been selected using several criteria. The criteria result from several discussions during 1992 among representatives of EPA, DOE, and their contractors, as well as from the analysis of data obtained during approximately one year's operation of an extensive network in the 300 Area (see attachment included in March 1993 Unit Managers Meeting minutes).

First, a well should be close enough to the river to be distinctly influenced by daily and weekly river stage fluctuations. These data help describe the inland extent of (1) river-induced pressure waves and (2) actual transport of river water, as well as define the vertical range for the water table.

Second, automated water level recorder arrays are designed to provide lines parallel and perpendicular to the shoreline. Analysis of these data provide information on water table variability, as well as gradients and flow direction.

Third, where paired wells completed at different depths are available, transducers are placed in each well. These data provide information on vertical variability in hydraulic properties of the unconfined aquifer, which is relevant to the potential downward migration of contaminants.

3.2 EQUIPMENT AVAILABILITY AND SCHEDULE CONSTRAINTS

Numerous water level recorders are already in operation in the 100 Areas, including river stage recorders at three areas. Equipment soon to become available from the 300-FF-5 Operable Unit will be transferred to the 100 Areas to augment existing arrays or establish new ones. The sequence of equipping new areas is approximated by the sequence of the presentation below.

A basic system to describe the flow system along each of the 100 Areas shorelines will be in place prior to September 1993. Water level measurement networks will be operated until sufficient data are collected to describe flow characteristics created by short-term (daily, weekly) and long-term (seasonal) fluctuations of the Columbia River. Subsequent modifications to the basic system, i.e. additional well installations, may be required as new data are evaluated.

The minimal data set needed to depict seasonal variability requires operation of the recorders during a July-November interval to represent low river stage, and a May-June interval to represent high river stage. These two time intervals are based on the 1992 hydrograph for the river at the 100-H Area and may vary from year to year, depending on water management at the dams. For new installations at those 100 Areas with no current coverage,

operation through June 1994 (assuming a start date no later than September 1993) is needed to cover the seasonal low and high river stage periods. The data from this period can then be interpreted during the following two months, to support Final Feasibility Study Reports, which are due to EPA and Ecology starting in September 1994.

3.3 AUTOMATED WATER LEVEL RECORDER INSTALLATIONS (FY 1993)

To obtain data that depict daily and weekly variability, water level measurements will be recorded at hourly intervals. This rate was selected for the 300-FF-5 network as appropriate to detect the daily passage of river-induced pressure waves. Recorders currently operating in the 100 Areas also use this rate. New recorders will continue to use this rate to provide continuity in the data set, as well as optimal resolution for timing the passage of daily river-induced pressure waves.

Using the criteria described above, wells in the 100 Areas have been identified as candidates for water level recorders. Where historical water level data are incomplete to describe the inland influence of daily fluctuations in the Columbia River, a temporary transducer array will be installed. Hourly data will be collected for several days, to capture short-term fluctuations. The results will help in the selection of wells for the automated stations.

The wells to be equipped may vary from the list presented below, depending on the results of the temporary installations, field surveillance of the candidate wells, and interpretation of data from new installations. The list represents a probable level-of-effort for the program. Some wells may be dropped from the list as the result of information gained by the temporary installations; others may be added. The well lists for each of the 100 Areas are presented in the order of priority for installation. An updated status chart for FY93 installations and location maps for the various reactor areas are included in Appendix A.

3.3.1 100-KR-4 Operable Unit

- Existing Equipment: K-18 and K-30
- Temporary Transducer Array: K-30, K-32A, K-34, K-35, and K-36
- Planned New Recording Equipment: K-31, K-32A, K-32B, and K-37
- Other Programs: 100-K Fuel Storage Basins operational monitoring

3.3.2 100-HR-3 Operable Unit (100-D Area)

- Existing Equipment: None
- Temporary Transducer Array: D5-13, D5-15, D5-20, D8-54A, and D8-54B
- Planned New Recording Equipment: D5-13, D5-15, D5-20, D8-54A, and D8-54B)
- Other Programs: 100-D Pond RCRA monitoring

3.3.3 100-HR-3 Operable Unit (100-H Area)

- Existing Equipment: H3-2A, H3-2C, H4-7, H4-9, H4-11, H4-12A, and H4-12C; river station; conductivity probes at H4-11 and the river station
- Temporary Transducer Array: None required
- Planned New Recording Equipment: H4-10 and H6-1; riverbank seepage area #153-1
- Other Programs: 183-H Solar Evaporation Basins RCRA monitoring

3.3.4 100-FR-3 Operable Unit

- Existing Equipment: F5-1, F5-4, and F5-6; river station
- Temporary Transducer Array: F1-2, F5-43A, F5-43B, F5-46, and F6-1
- Planned New Recording Equipment: F1-2, F5-43A, F5-43B, F5-44, F5-46, and F6-1 (relocate equipment from F5-1 to F5-43B and from F5-6 to F5-44)
- Other Programs: None

3.3.5 100-BC-5 Operable Unit

- Existing Equipment: B3-1, B4-1, and B4-4; river station
- Temporary Transducer Array: B2-13, B3-46, and B5-2
- Planned New Recording Equipment: B2-12, B2-13, B3-46, B3-47, B5-2, and B4-1 (relocate equipment from B4-4 to B5-2)
- Other Programs: None

3.3.6 100-N Area

- Existing Equipment: Manual river level recorder. NOTE: Automated water level data needs for the 100-N Area are being defined by the Expedited Response Activity. Future needs may be channeled through the 100-Areas program as they are identified.
- Planned Installations: Automated river station
- Other Programs: 1301-N, 1325-N, and 1324-N/NA RCRA monitoring; 100-N Area Expedited Response Activity

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4.0 APPLICATIONS FOR DATA FROM AUTOMATED SYSTEMS

The data sets produced by the equipment installations and monitoring activities to be initiated under M-30-05 are intended primarily to depict the direction, rate, and variability of flow in each of the 100 Areas, as well as a description of the inland extent of the Columbia River's influence on groundwater quality (see Section 1.2). Data collection and interpretation will continue beyond the September 1993 milestone date.

These data sets may be suitable for other applications beyond the obligations of M-30-05. One example is supporting future studies associated with inferring aquifer properties from cyclic water level fluctuations (e.g., McMahon and Peterson, 1992; Gilmore and others, 1992). The data may also prove useful in identifying areas of relatively high and low transmissive zones. The automated data logging system may be used to obtain data for planning remediation activities, such as pumping and treating contaminated groundwater, as well as monitoring the results of such activities.

4.1 DIRECTION, RATE, AND VARIABILITY OF FLOW

The water level data obtained from the monitoring well and river station recorders will be analyzed using two approaches: (1) Graphical and statistical depiction of water table variability and (2) analysis of hydraulic head gradients. Data sets can also be assembled to support computer modeling of flow conducted under other programs, when requested.

Graphical depiction of variability includes profiles along and perpendicular to the river. These profiles will show the vertical range of water table fluctuations, along with descriptive statistical measures such as mean, mode, and standard deviation. The data will be described for daily, weekly, and seasonal variability. Steel tape measurements from nearby, non-transducer equipped wells will be superimposed on the data logger records. The water table will be depicted relative to stratigraphic units determined from geologic logs for the wells.

Water table gradients will be calculated between pairs of wells within and between the parallel and perpendicular rows in each 100 Area. Elevations along either side of the perpendicular row can be estimated using linear extrapolation from the known measurement points (wells). In this way, a synoptic map of the water table for an area larger than the immediate "T" arrangement can be constructed. Flow rate and direction for areas where there are no monitoring wells can be inferred from this map.

4.2 WATER QUALITY IN SHORELINE MONITORING WELLS

An improved understanding of how river levels influence groundwater quality in shoreline wells will result from data gathering activities designed to track river water as it moves into and out of the river bank. Electrical conductivity, a measure of dissolved salts in water, is an excellent tracer, since river water is much lower than natural groundwater. Conductivity probes are currently obtaining hourly measurements in the 100-H Area, in a well

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located close to the river and in the river itself. A third probe is planned for installation in a riverbank seep during the low water period during 1993, which typically starts in July.

It is well established by existing data that concentrations of waste indicator constituents are influenced by water table fluctuations, both short-term in the wells closest to the river, and longer-term changes due to seasonal fluctuations in wells located farther inland. The influence on observed concentrations comes not only from bank storage of river water, but from interaction with the soil column that immediately overlies the water table. This leads to periodic saturation of a part of the normally unsaturated soil column (which may contain residual, soluble waste residues) during periods of high water levels. This phenomenon has been previously described for groundwater contamination that resulted from operations at the 183-H Solar Evaporation Basins (Peterson 1990 and 1991).

Where historical data exist, electrical conductivity values (or data for dissolved salts such as chloride) will be plotted for shoreline wells to help identify the zone of river influence in the 100 Areas. Relatively few wells are located within this zone, so the historical data set may be too limited to create a definitive map for each of the 100 Areas. However, new analytical results from the CERCLA sampling program are now available, as are data from conductivity probes installed as part of the M-30-05 program. Both data sources are helping to improve this situation.

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Woodruff, R. K. and R. W. Hanf, eds. 1992, *Hanford Site Environmental Report for Calendar Year 1991*, PNL-8148, Pacific Northwest Laboratory, Richland, Washington.

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APPENDIX A: Equipment Installation Status and Well Location Maps

Table A-1 shows the status of automated water level recorder installations as of August 1993.

The following location maps show the wells identified in Section 3.3. Existing automated water level recorders are shown by closed circles around the well number.

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Table A-1. Status of Equipment Installations #12/Page 16 of 30

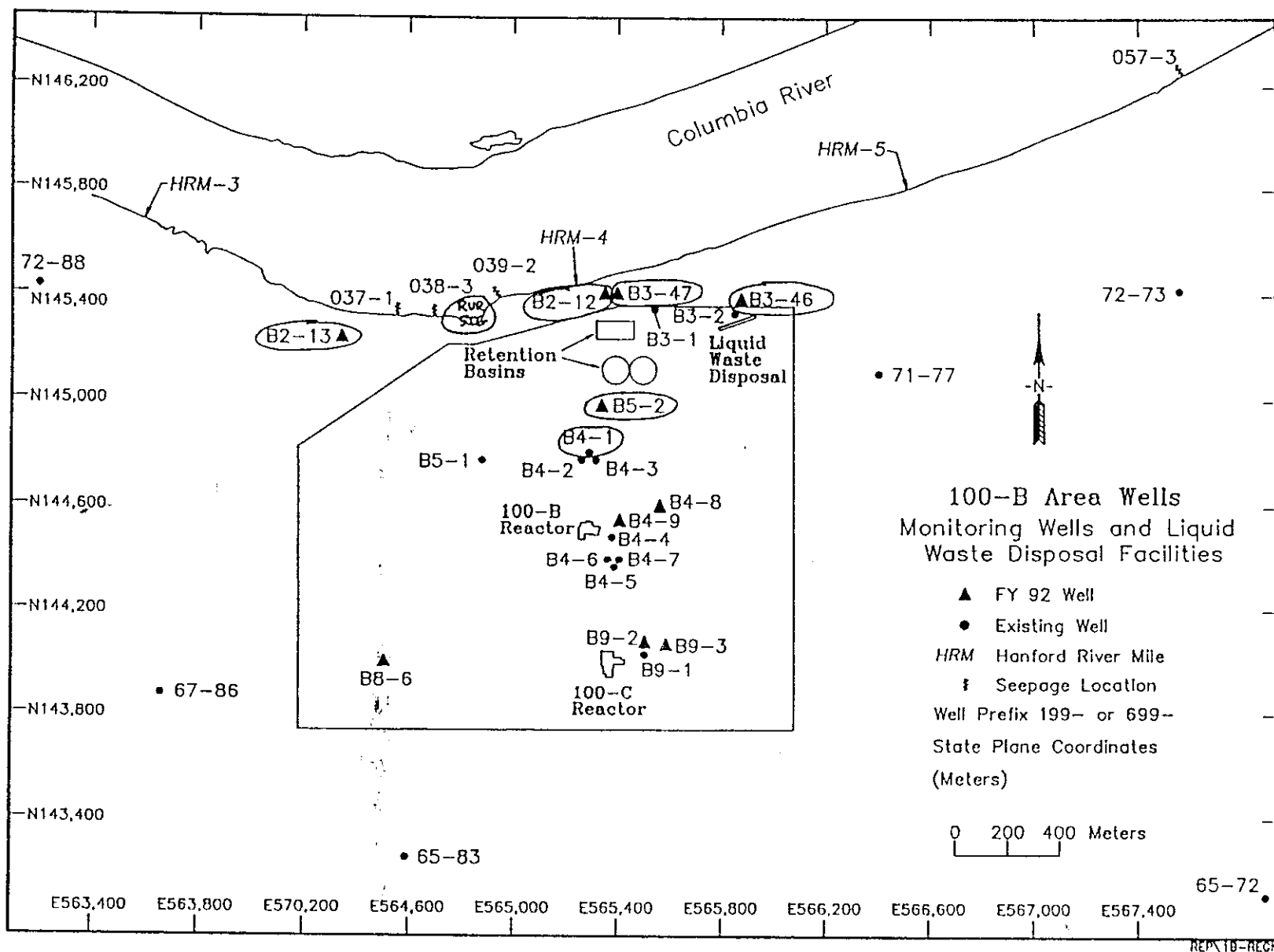
Status as of August 1993

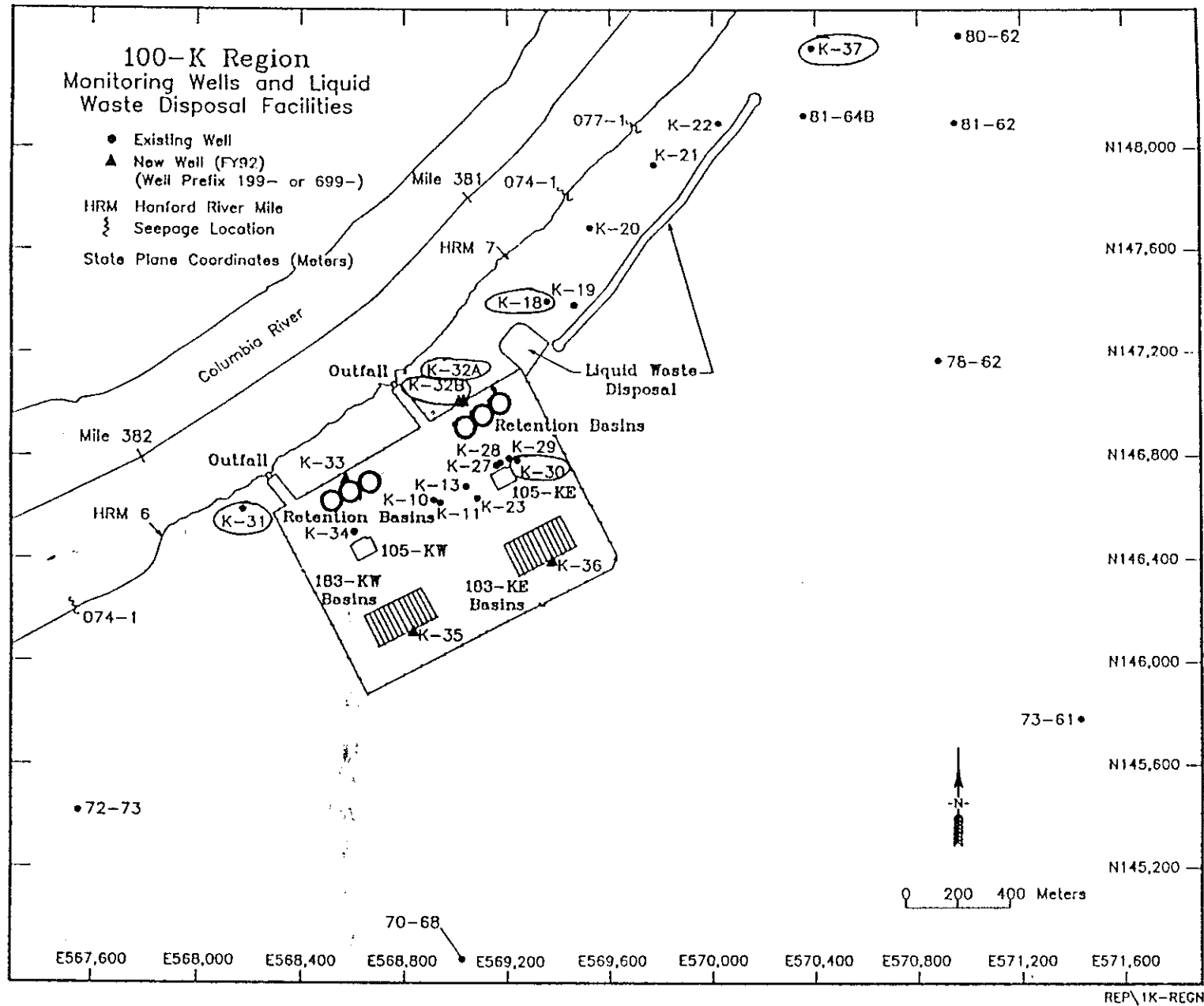
REACTOR AREA: Phase I Phase II	Sta- tion No.	Approximate Start Date	On Line ?	Approximate End Date	Comments
100-B AREA: River B3-1 B4-1 B4-4 B2-12 B2-13 B3-46 B3-47 B5-2	114 31 41 44 191 143 192 191 141	03/11/92 09/27/91 09/23/91 09/27/91 05/27/93 05/29/93 05/28/93 05/28/93 05/31/93	Yes No Yes No Yes Yes Yes Yes Yes	05/93 05/93	Moved to B3-47 Moved to B5-2
100-K AREA: K-18 K-30 K-31 K-32A K-32B K-37	183 180 181 182 182 184	05/21/93 05/21/93 05/21/93 05/21/93 05/21/93 05/27/93	Yes Yes Yes Yes Yes Yes		
100-N AREA: River	133	08/05/93	Yes		Replacement for manual recorder
100-D AREA: D5-13 D5-15 D5-20 D8-54A D8-54B	171 170 172 173 173	05/21/93 05/19/93 05/19/93 05/19/93 05/19/93	Yes Yes Yes Yes Yes		
100-H AREA: River H3-2A H3-2C H4-7 H4-9 H4-10 H4-11 H4-12A H4-12C H6-1 S153-1	125 138 138 124 123 160 137 122 122 161 139	12/05/91 03/09/93 11/10/92 09/16/91 09/26/91 06/14/93 05/06/93 09/16/91 02/11/93 05/28/93 06/16/93	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes		Added conductivity Added conductivity Temper/Cond only

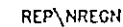
Table A-1 continued . . .

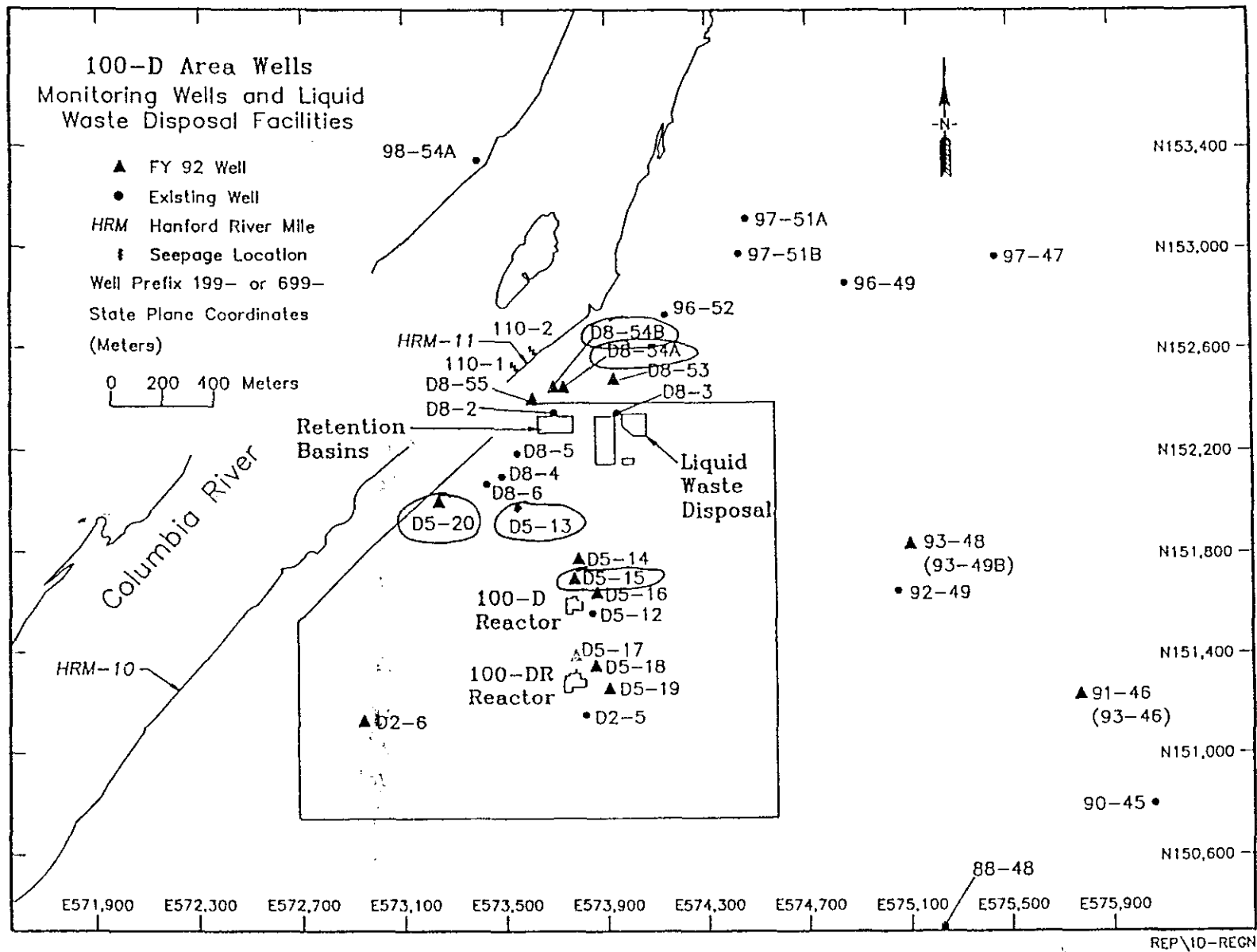
Status as of August 1993

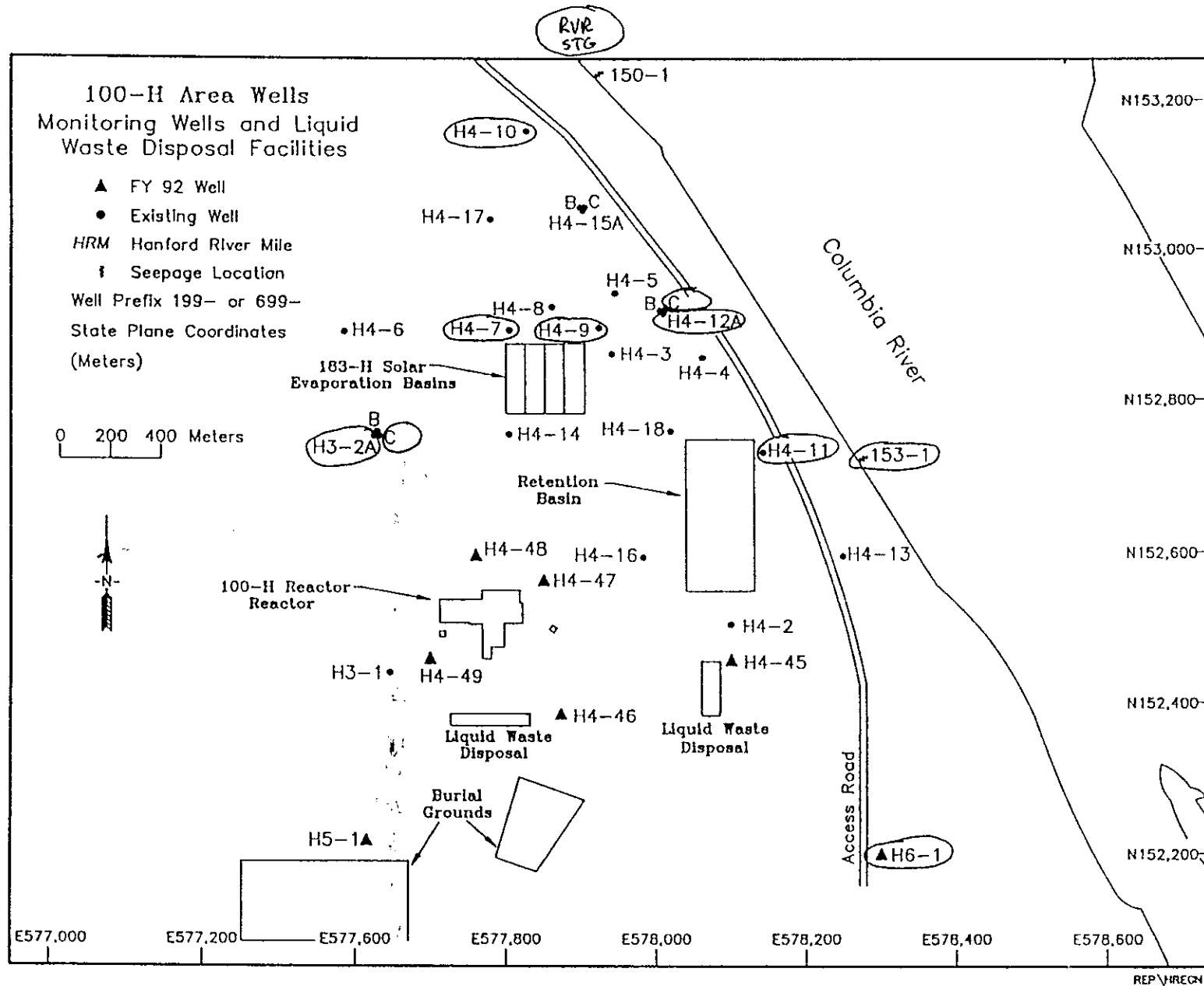
REACTOR AREA: Phase I Phase II	Sta- tion No.	Approximate Start Date	On Line ?	Approximate End Date	Comments
100-F AREA:					
River	140	11/19/92	Yes		
F1-2	132	06/04/93	Yes		
F5-1	51	09/12/91	No	06/93	Moved to F5-43B
F5-4	54	09/12/91	No	06/93	Removed
F5-6	56	09/12/91	No	06/93	Moved to F5-44
F5-43A	151	06/04/93	Yes		
F5-43B	151	06/04/93	Yes		
F5-44	144	06/04/93	Yes		
F5-46	154	05/20/93	Yes		
F6-1	152	06/04/93	Yes		

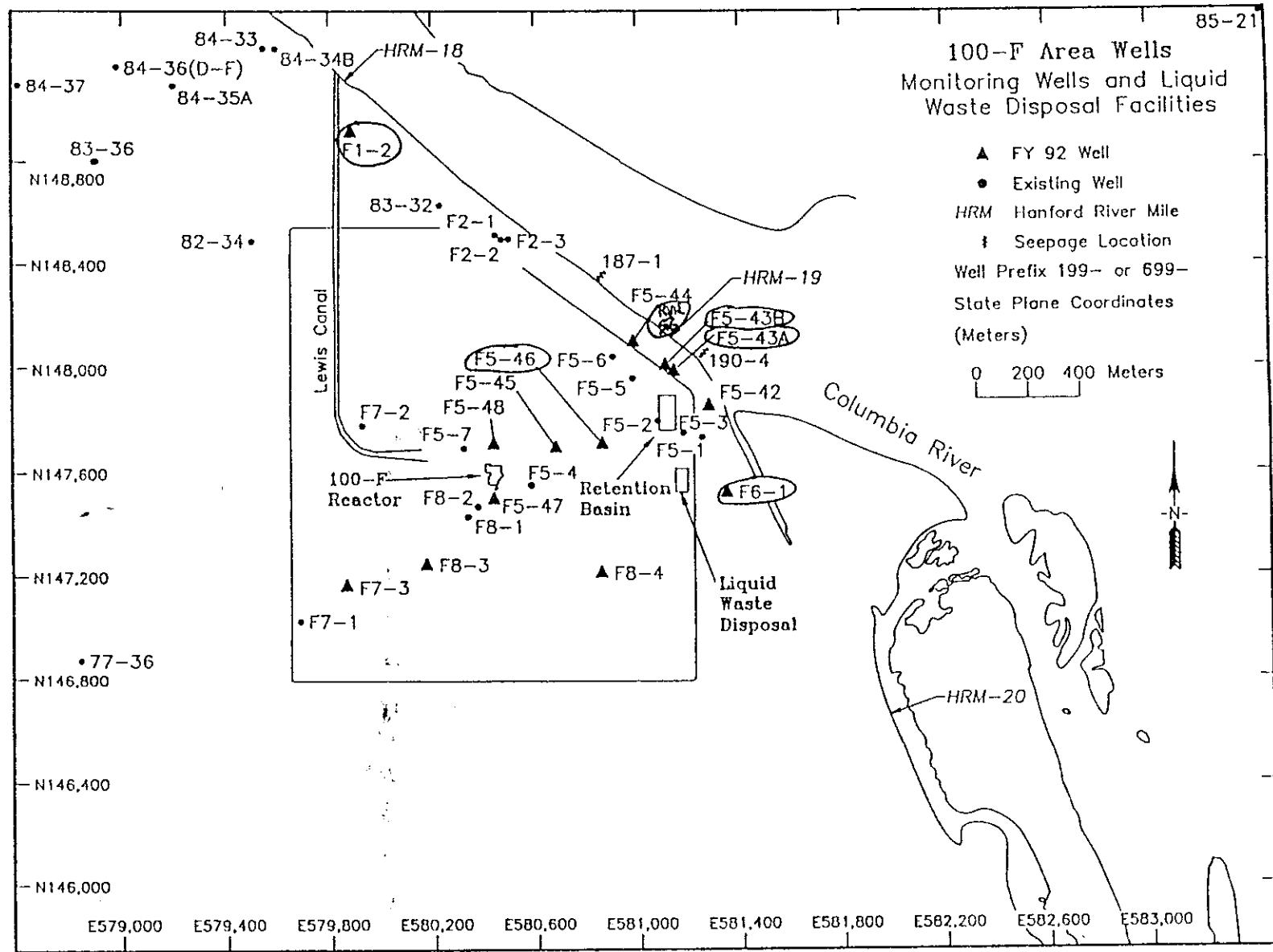












REP\IF-RECH

APPENDIX B: Response to EPA and Ecology Comments on Draft NPL Agreement Form

RESPONSE TO EPA AND ECOLOGY COMMENTS ON 100 NPL AGREEMENT FORM:
OBLIGATIONS TO BE MET UNDER TPA MILESTONE M-30-05

R. E. Peterson
June 29, 1993

INTRODUCTION

Tri-Party Agreement Milestone M-30-05 involves the installation of equipment and initiation of monitoring activities that pertain to the interaction between the Columbia River and unconfined aquifer in the 100 Areas. A description of planned work has been prepared that describes activities proposed to meet the obligations of M-30-05. That plan has been submitted to the U.S. Environmental Protection Agency (EPA) and Washington Department of Ecology (Ecology) for their comments and concurrence, in the form of an attachment to 100 NPL Agreement Form, Control Number 52, dated 5/26/93.

Comments from both the EPA (including the U.S. Geological Survey) and Ecology have been received. Responses to those comments are presented below. Changes to the 5/26/93 draft plan are indicated by marginal redlines in the revised 100 NPL Agreement Form and its attachment.

GENERAL COMMENTS

(USGS/EPA) The M-30-05 milestone objectives, as stated in this plan, are those we agreed to at the 3/24/93 Unit Managers' Meeting.

(USGS/EPA) The data needed to make a detailed evaluation of the well networks in the plan are not available to us at this time (see Comment on Page 3, Section 2.1, 3rd paragraph, line 1). Therefore, we were only able to evaluate the general approach presented.

(USGS/EPA) The success of the data networks will depend on our ability to modify them as needed as we receive and evaluate additional data (see Comment on Page 7, Section 3.2, 2nd paragraph, line 3).

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SPECIFIC COMMENTS

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1. Comment (USGS/EPA) Page 3, Section 2.1, 3rd paragraph, line 1:

This supporting document will contain much of the information necessary to fully evaluate the adequacy of the recorder networks proposed in this document. This information is not presently available to the regulators. When this information is available, the regulators may want to reassess the "proposed" (by then installed) networks.

Response Interpretation of hourly water level data already gathered in some of the 100 Areas is currently in progress. Both the data and unpublished interpretations can be made available to regulators at their request. Special topics discussions during the monthly unit managers meetings are a suggested forum. It is anticipated that the actual locations and number of operating stations may change as new data are interpreted.

2. Comment (USGS/EPA) Page 3, Section 2.2:

This task appears to be completed except for the 100-BC-5 OU. Is this the only "planned" temporary transducer array not already installed, operated, and removed?

Response This task is essentially complete for the "core" network of installations at each reactor area (June 1993). However, temporary transducer installations will be deployed in new or supplemental locations whenever it is uncertain as to whether or not the well responds to short-term variations.

3. Comment (Ecology) Page 4, Section 2.3, 2nd paragraph:

A reference is made to Section 4 of this Plan, however, Section 3 is more appropriate. There is also a reference made to Section 5, which actually includes the references. This probably should be a reference to Section 4.

Response (Text revised)

4. Comment (USGS/EPA) Page 5, Section 2.5:

To date the regulators have only received very brief descriptions of the equipment and techniques being used in regard to borehole velocity measurements. Therefore, the probable effectiveness of this part of the plan cannot be adequately addressed by the regulators at this time.

Response The borehole velocity meter currently in use at Hanford has undergone fairly extensive field trials, which included measurements in the 100-H and 100-K Areas. This experience resulted in some re-design of the equipment, which is now complete (June 1993). A data logger interface is being investigated that would allow unattended recording of flow velocity in a well. The meter is a Geoflow Model 40L (manufactured by KV Associates, Inc., Falmouth, MA 02540).

5. Comment (Ecology) Page 5, Section 2.5, Task 5:

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If the flow meters are to be installed permanently, you may need to request a variance from WAC 173-160. This is presently being discussed with the Environmental Field Services group.

Response Noted.

6. Comment (USGS/EPA) Page 5, Section 2.6, 2nd paragraph, lines 5-6:

It is not clear what is meant by "additional field experiments". Do the three conductivity probes discussed represent the entire planned conductivity network or will additional conductivity probes be installed (some in each operable unit)?

Response (Text revised) No. The installations in a well, seep, and nearshore river station at 100-H are the "proto-type" to help determine how useful additional installations at other Areas might be. Currently, the conductivity installations are focused more on understanding the interaction process, rather than describing variations among the reactor areas. However, other conductivity measurements from well sampling are being analyzed at each reactor area to help define the inland extent of river influence. This is a part of Task 1.

7. Comment (USGS/EPA) Page 5, Section 2.6, 3rd paragraph, lines 1-3:

How many borehole conductivity measurements will be made, and where? Or at least an estimate of numbers and locations?

Response (Text revised) See response to comment #6. Detailed plans for these additional automated measurements have not yet been made. A list of future locations will be made available to the regulators by September 1993, when the plan attached to the 100 NPL Agreement form is updated, based on data currently being collected.

8. Comment (USGS/EPA) Page 5, Section 2.6, 3rd paragraph, lines 5-7:

It is stated that borehole conductivity profiles will be taken from wells located within the zone of daily/weekly influence of bank storage. How will these wells be identified? The water-level data will tell us which wells experience head changes due to river fluctuations, but will not identify those wells where bank storage is operable (i.e., where river and aquifer waters are mixing).

Response (Text revised) Several wells located closest to the river will be used for profiles in each reactor area. The timing of measurements will be coordinated with river levels -- i.e., when influx of river water is most likely to be occurring. Insight from current data gathering activities in the 100-H Area will help determine this timing.

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9. Comment (Ecology) Page 6, Section 2.7, 2nd paragraph: #12/Page 27 of 30

The last sentence states that "other reports will be generated as the needs of various information users arise." This is vague. There should be more specifics attached here. Funding may not allow additional reports unless there are some specifics tied to this agreement.

Response Agreed that the reference is vague; however, this is by necessity at this time, since the future users of the information generated by this program are not fully identified. Future reports will be better identified when a revision to this 100 NPL Agreement activity plan is made during September 1993 (see comment #7). The users of information generated by M-30-05 activities will provide funding for reports as they need them.

10. Comment (USGS/EPA) Page 7, Section 3.2, 2nd paragraph, line 3:

It is stated that the networks will be operated until sufficient data are collected to describe flow characteristics. The phrase "sufficient data" suggests, but does not clearly state, that the networks as defined in this plan may require modification (e.g., additional wells) in order to achieve the goal of "sufficient data".

Response (Text revised) The reference is to length of time that the equipment must operate to obtain seasonal data. The paragraph has been modified to reiterate the potential need to change locations and numbers of installations as time goes by.

11. Comment (USGS/EPA) Page 7, Section 3.2, 3rd paragraph, lines 9-12:

The timing for obtaining and interpreting the water-level data in time to support the Final Feasibility Study Reports is highly speculative. As indicated, the timing of the river highs and lows from year to year is an unknown.

Response Noted. It is anticipated that the information generated by this important characterization activity will apply to more than supporting Final Feasibility Study Reports alone. An improved understanding of the contaminant pathway from the Hanford Site to the Columbia River seems fundamental to informed decisions regarding environmental restoration.

12. Comment (USGS/EPA) Page 7 (rev. 8), Section 3.3, 3rd paragraph, line 3:

It is stated that the list of installations is a "maximum" level-of-effort. As stated in an earlier comment (Page 7, Section 3.2, 2nd paragraph, line 3), additional wells may need to be instrumented in order to obtain "sufficient data". Therefore, the list of installations probably does not represent the maximum level-of-effort required, but rather a reasonable level based on existing information.

Response (Text revised)

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13. Comment (Ecology) Page 7 (rev. 8), Section 3.3, 3rd paragraph:

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It is stated that the "list represents an estimated maximum level-of-effort for the currently proposed program. Some wells may be dropped from the list as the result of information gained by the temporary installations." It is also possible that after evaluating information from the temporary installations, additional wells could be proposed and possible other temporary installations could be installed. It probably would be more accurate to state that the list may be modified based on the results from the temporary installations.

Response (Text revised)

14. Comment (USGS/EPA) Page 7 (rev. 8), Section 3.3, 3rd paragraph, line 6:

It is stated that the list of installations is presented in order of priority for installation. On what basis was this prioritization made?

Response Reactor areas with no current monitoring equipment and a clear need for water table information came first (e.g. 100-K, because of its fuel storage basin issue, and 100-D because of chromium). Next came 100-H, since well locations permit a comprehensive array, and only minor changes to the array were planned (which could be completed quickly). The 100-H Area seems best suited for improving our understanding of river/aquifer interaction processes. The 100-F and 100-B Areas followed, since no significant plumes are currently recognized in those areas. The 100-N Area was placed last, since abundant groundwater flow information appears to be available already through other programs.

15. Comment (USGS/EPA) Page 9, Section 3.3.6, 1st bullet:

Will the activities of the 100-N Area ERA result in a satisfactory data set for M-30-05 goals? This question needs to be answered in time to install any needed additional instrumentation by the 9/93 M-30-05 deadline.

Response Meeting M-30-05 goals is not contingent on the results of the 100-N ERA. The basic flow information that may be generated by the data logger program is already available to some extent from previous work at 100-N (see bibliography at end of these comments). Flow information is then applied to modeling contaminant flux, which has been done at 100-N.

One goal of M-30-05 is to have the monitoring equipment available for application to the 100-N Area ERA, should it become necessary, regardless of the September 1993 milestone date. That capability currently exists. Other data logger programs have already produced high frequency data that were used in the strontium-90 investigations, and also provided an improved understanding of how river levels influence the water table under 1301-N.

16. Comment (Ecology) Page 9, Section 3.3.6, last bullet:

It is possible to plan for installation of equipment for a 100-N Area Expedited Response Activity, however, whether or when an 100-N Area ERA will be done has not been determined.

Response Noted. (Also, see response to Comment #15)

17. Comment (USGS/EPA) Page 9 (rev. 10), Section 4.0, 2nd paragraph, line 1:

In order to gain the maximum use of the networks for "inferring aquifer properties", additional wells (beyond the planned networks) will probably be needed. This could be accomplished by further use of the temporary transducer arrays. As data are collected at each OU, improved interpretations of the respective flow systems will be possible. This should allow us to identify additional wells which, with temporary transducers, could provide much improved estimates of aquifer properties. This approach could be used in OUs, or parts of OUs, where it is determined that better estimates of aquifer properties are required.

Response We fully agree and support the reviewer's comment. The activities being initiated under M-30-05 are iterative and dependent on the information gained as the program proceeds; these activities will extend well beyond the September 1993 milestone date. The data gathering equipment used, be it automated recorders, temporary arrays, or a variety of sensors, will be tailored to provide the information being sought to support "long-term evaluation of Columbia River and unconfined aquifer interaction . . ."

18. Comment (USGS/EPA) Page 10 (rev. 11), Section 4.2, 3rd paragraph:

It is stated that "historical data" will be used to identify the zone of river influence. Presumably, the new data being collected (specific conductivity probes) will also be used (see earlier comment; Page 5, Section 2.6, 2nd paragraph, lines 5-6).

Response (Text revised) Yes, all available data, including historical data; recent sampling associated with CERCLA remedial investigations (or limited field investigations); RCRA/Operational monitoring; Sitewide Environmental Surveillance; and data obtained during the conductivity experiments described in Task 6 and responses to comments #6, 7, and 8, will be used for this purpose.

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Bibliography: 100-N Area Reports Relevant to M-30-05 Objectives

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- Gilmore, T.J., J.V. Borghese, H.P. McDonald, and D.R. Newcomer, 1990, *Evaluation of the Effects of the Columbia River on the Unconfined Aquifer Beneath the 1301-N Liquid Waste Disposal Facility*, PNL-7341, May 1990, Pacific Northwest Laboratory, Richland, Washington, 33 pp. plus appendices.
- Gilmore, T.J., J.V. Borghese, and D.R. Newcomer, 1991, *Evaluation of the Effects of the Columbia River on the Unconfined Aquifer Beneath the 100-N Area*, PNL-7646, May 1991, Pacific Northwest Laboratory, Richland, Washington, 23 pp. plus appendix.
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- Gilmore, T.J., J.V. Borghese, and D.R. Newman, 1993, "Effects of River Stage and Waste Water Discharges on the Unconfined Aquifer, Hanford, Washington," *Ground Water Monitoring and Remediation*, Vol. 13, No. 1, pp. 130-138.
- Lu, A.H., 1991, *Simulation of Strontium-90 Transport From the 100-N Area to the Columbia River Using VAM2DH*, WHC-EP-0369, April 1991, Westinghouse Hanford Company, Richland, Washington. (VAM2DHtm of HydroGeologic, Inc.)

Control Number 58	100 NPL Agreement/Change Control Form ___ Change <u>X</u> Agreement ___ Information Operable Unit: <u>100-HR-3</u>	Date Submitted: 8/25/93 Date Approved:									
Document Number and Title: Federal Facility Agreement and Consent Order		Date Document Last Issued: November, 1992									
Originator: J. B. Duncan		Phone: 372-0896									
Summary Description: The TPA Milestone, M-15-06B, "Complete 100-HR-3 OU Treatability Study Activities. Interim milestone completion date: November 30, 1993". This NPL form is to document the agreement that Milestone M-15-06B will be considered complete when laboratory bench-scale efforts are completed by November 30, 1993. Westinghouse releasable supporting document reports (detailing biodenitrification studies by PNL and precipitation/ion exchange studies by WHC) will be issued by January 30, 1994.											
Justification and Impact of Change: There are no perceived impacts.											
<table border="0"> <tr> <td>R. L. Biggerstaff WHC Operable Unit Coordinator</td> <td><u>Richard L. Biggerstaff</u></td> <td><u>9/14/93</u> Date</td> </tr> <tr> <td>E. D. Goller DOE Unit Manager</td> <td><u>Eric Goller</u></td> <td><u>9/14/93</u> Date</td> </tr> <tr> <td>D. Goswami Washington Dept of Ecology Unit Manager</td> <td><u>D. Goswami</u></td> <td><u>9/14/93</u> Date</td> </tr> </table> <p>Per Action Plan for Implementation of the Hanford Consent Order and Compliance Agreement Section 9.3</p>			R. L. Biggerstaff WHC Operable Unit Coordinator	<u>Richard L. Biggerstaff</u>	<u>9/14/93</u> Date	E. D. Goller DOE Unit Manager	<u>Eric Goller</u>	<u>9/14/93</u> Date	D. Goswami Washington Dept of Ecology Unit Manager	<u>D. Goswami</u>	<u>9/14/93</u> Date
R. L. Biggerstaff WHC Operable Unit Coordinator	<u>Richard L. Biggerstaff</u>	<u>9/14/93</u> Date									
E. D. Goller DOE Unit Manager	<u>Eric Goller</u>	<u>9/14/93</u> Date									
D. Goswami Washington Dept of Ecology Unit Manager	<u>D. Goswami</u>	<u>9/14/93</u> Date									

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Table 6-14. Summary of the Recreational Scenario Intakes for Non-Radioactive Contaminants at the Process Trenches and Process Ponds. (Sheet 3 of 3)

Contaminant	Fugitive Dust Inhalation ^a (mg/kg-d)		Volatile Inhalation ^a (mg/kg-d)		Game Bird Ingestion (mg/kg-d)	
PCBs	- ^c	- ^g	- ^d	- ^d	- ^e	4.3E-08
<p>^aIntakes are shown only for those contaminants with toxicity values for the inhalation pathway.</p> <p>^bVolatile intake calculated from a measured concentration in soil at the waste management unit.</p> <p>^cRfD not available to evaluate intake for this pathway.</p> <p>^dNot evaluated for this exposure route because it is not a volatile.</p> <p>^eNot classified as a carcinogen or not carcinogenic via this exposure route or pathway.</p> <p>^fGame birds do not forage at this active waste management unit.</p> <p>^gSF not available to evaluate intake for this pathway.</p> <p>^hIntake adjusted based on 30% absorption of inhaled arsenic (EPA 1993).</p> <p>ⁱNickel is considered carcinogenic as refinery dust, see Section 4.3.2.2.5 for discussion.</p> <p>^jNot a contaminant of potential concern for this exposure route or pathway.</p>						

Distribution
Unit Manager's Meeting: 100 Aggregate Area/100 Area Operable Units
September 29, 1993

Julie K. Erickson /Eric Goller DOE-RL, ERD (A5-19)
Mike Thompson DOE-RL, EAP/RPB (A5-19)
Diane Clark DOE-RL, TSD/SSB (A5-55)
Heather Trumble DOE-RL, OTD/FTB (A5-19)
Steve Balone DOE-HQ (EM-442)

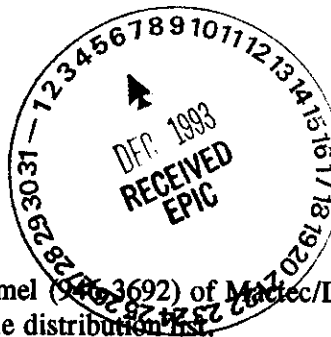
Dennis Faulk 100 Aggregate Area Manager, EPA (B5-01)
Ward Staubitz, USGS Support to EPA
Audree DeAngeles, PRC Support to EPA

Jack Donnelly 100 Aggregate Area Manager, WDOE (Kennewick)
Larry Goldstein WDOE (Lacey)

Lynn Albin Washington Dept. of Health

~~Tom Wintczak, WHC~~ Program Manager (H6-27)
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